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NUCLEAR WEAPON EFFECT RESEARCH AT PSR—1983. ~~XXXXXX~~
Estimated Effects of Intermediate Levels of Nuclear Radiation
upon the Performance of Military Tasks
A Questionnaire Assessment

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) Predicted military performance data were collected from questionnaires administered to 161 noncommissioned officers (NCOs) representing four different combat crews including artillery (both gun and fire direction center (FDC)), armor, and antiarmor personnel. The study focuses on respondents from small crews of three or four members. These crewmembers were asked to provide information that could readily be modeled--crew missions, operational scenarios, and task performance, where combat encounters are decisive and usually brief, typically lasting between 30 and 90 sec. Questionnaires contained detailed descriptions of the signs and symptoms of acute radiation sickness for exposure from 75 to 4500 rads (cGy) free-in-air, together with lists of familiar tasks performed by crewmembers for the selected combat encounter scenarios. The respondents supplied judgmental data for task performance capability of a typical crewmember for each of 30 or 40 illness conditions portrayed by the individual set of sign					
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and symptom descriptions. The effect of each symptom set was assessed in terms of (1) the percent of respondents who judged that task performance would be unaffected by the illness, (2) the percent of respondents who judged that tasks could not be performed at all, and (3) the extent of performance degradation based on an increase in time required for task completion compared with the normal time expected. In addition to military tasks, all respondents judged how the performance of six ordinary tasks, such as climbing and lifting, would be affected by the symptom sets.

Questionnaire responses were tabulated and analyzed to provide predicted performance information for separate tasks, individual crewmembers, and crew types as well as respondent demographic data. Predicted performance decrement profiles versus symptom complex severity were developed for various crewmembers and crew types to illustrate variations based on the kinds of tasks performed in combat. In addition to the military tasks, ordinary (nonmilitary) task response data collected from the questionnaires were analyzed in order to compare and assess the consistency of prediction between both groups of tasks.

Rank order correlation techniques for sample data were applied to determine the extent of correlation between tasks performed by each of 15 individual crewmembers representing the four crews of the questionnaire sample. Rank order correlation assessments of symptom complex severity were made based on task performance prediction within crew position (i.e., for each crewmember), across crewmembers (i.e., each crew), and across all crews. Multiple regression was applied to determine the feasibility of developing performance prediction relationships based on symptom complex composition and severity, and to identify the relative importance of symptom complex components: (1) upper gastrointestinal distress, (2) lower gastrointestinal distress, (3) fatigability/weakness, (4) hypotension, (5) hematological effects, and (6) fluid loss/electrolyte imbalance.

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SUMMARY

This study was conducted to investigate the expected effects of intermediate doses of radiation on the performance of military and non-military tasks. Four groups of operational U.S. Army personnel at three sites were administered questionnaires. The respondents estimated the effects of 30 to 40 illness conditions (sets of symptoms) on performance of military tasks specific to the artillery gun battery, fire direction center (FDC), armor tank, or mounted tube-launched, optically-tracked, wire-guided (TOW) systems. In addition, all respondents judged how the performance of six ordinary tasks, such as climbing and lifting, would be affected by the symptom sets. These sets were composed of symptom descriptions from each of six symptom categories: (1) upper gastrointestinal distress, (2) lower gastrointestinal distress, (3) fatigability/weakness, (4) hypotension, (5) hematological effects, and (6) fluid loss/electrolyte imbalance. These categories were selected to represent a range of low to high severity of radiation sickness.

Preliminary analysis indicated that performance estimates for tasks that were specific to each crew position were highly correlated within symptom sets. Moreover, the rank order of symptom sets in terms of their expected severity of effect on task performances was nearly invariant across tasks within positions. Therefore, tasks were averaged within their respective positions for all analyses reported here.

The effect of each symptom set was assessed in terms of (1) the percent of respondents who judged that performance would be unaffected by the illness, (2) the percent of respondents who judged that performance would result in incapacitation, and (3) the average expected degradation, expressed as a percent of normal performance. In addition, multiple regression analyses were used to identify the relative importance of each of the six components of the symptom sets in determining the expected degree of impairment.

The order of perceived severity for the symptoms and the mean levels of effects were strongly consistent within and across types of

crews. A large percentage of respondents expected illness, even at mild levels, to affect performance to some degree at all crew positions. In addition, incapacitation was expected for most positions by 20 percent or more of the respondents at moderate to severe illness levels. The data on the average percent of normal performance indicated that respondents expected a sharp decline in crewmember performance across symptom sets and ranged between 55 and 71 percent of normal performance for the various crew positions. The regression analyses suggested that it is feasible to predict expected performance through knowledge of symptom severity levels. Across crews, approximately 43 percent of the variation in the rating was accounted for by the symptom components used to construct illness descriptions. The symptoms associated with fatigability/weakness and fluid loss contributed most substantially to the expected levels of performance.

Results regarding ordinary tasks led to similar conclusions with respect to the expected impairments, with mean performance across symptoms ranging between 35 and 57 percent of normal performance. The strongest predictors of expected performance were found to be fatigability/weakness and fluid loss.

PREFACE

This report was prepared by the Organization Research Group of Tidewater, Inc. (ORG) for the Pacific-Sierra Research Corporation (PSR), as part of PSR subcontract 83-0015-1 of Defense Nuclear Agency (DNA) government contract DNA001-83-C-0015. The subcontract was monitored for PSR by George Anno. Albert S. Glickman was the principal investigator and Ben B. Morgan, Jr., the coprincipal investigator for ORG.

The material presented reports the results of the questionnaires and the procedures used in administering them to army combat crew personnel. The questionnaires were given in order to obtain crew predictions on the extent to which combat task performance would be affected by radiation sickness symptoms.

The responses to the questionnaires were gathered and preliminary analysis was performed to provide input for a more extensive analysis of the data required for DNA's Intermediate Dose Program (IDP) to assess the acute radiation effects on individual combat crewmember performance.

The authors would like to acknowledge the assistance of the many individuals who contributed to the research. We are especially grateful to George Anno and Don Wilson of PSR for their time and continued support of ideas in all phases of the project. They were responsible for designing the questionnaire, aiding in pretesting and data collection efforts, and were helpful in planning the statistical analyses. The feedback provided by the members of DNA's IDP Core Group substantially added to the content of this report.

We would also like to express appreciation to Stephen L. Goldberg of the Army Research Institute Fort Knox Field Unit, Kentucky, for serving as DNA technical monitor for this subcontract project, for making arrangements to collect data at Fort Knox, and for coordination with other army sites. We are indebted to Thomas E. Kinney, Jr., Liaison Officer, U.S. Army Human Engineering Laboratory, Fort Sill, Oklahoma, and to Jan Chervenak, Acting Chief, Division of Evaluation and Standardization, U.S. Army Infantry School, Fort Benning, Georgia, who were instrumental in finding respondents and in coordinating local

logistics. Gerald L. Gamache of ORG filled a valued role in assisting with data collection at Fort Sill.

Finally, the authors would like to acknowledge all of the military personnel who supplied data for the study. Their contribution is quite obviously an invaluable part of this research.

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SECTION 1

INTRODUCTION

The threat of nuclear conflict makes it imperative that the effects of radiation exposure upon human performance of military tasks are estimated as accurately as possible and that an adequate groundwork is established for developing concepts and doctrine that will deal most effectively with that threat. Toward this end, the Defense Nuclear Agency (DNA) has initiated a program to assess the current state of knowledge concerning the effects of nuclear radiation. The primary objectives of this program are (1) to first revise the available information concerning the physical, physiological, psychological, and performance effects of nuclear radiation, (2) to use portions of this information to estimate the nature and degree of functional impairment of specific task performance in military personnel who experience symptoms of illness that might be produced by different amounts of battlefield radiation at various time intervals after exposure, especially involving radiation doses that are less than totally incapacitating, and (3) to use these estimates to simulate, through the use of mathematical modeling techniques, the degrading effects of nuclear combat scenarios on the operational effectiveness of various types of military units. The ultimate goal of this effort is to provide a basis for projecting the probable decrements in combat effectiveness of military units as functions of the levels of radiation and time since exposure. In turn, these projections may be useful in planning the targeting and defensive assignments of units required to engage in nuclear battle.

The focus of DNA's Intermediate Dose Program (IDP) has been to review the effects of exposure to radiation in the range of greatest uncertainty; namely, from approximately 75 to 4500 rads, free-in-air dose exposure. This effort, conducted primarily by the Pacific-Sierra Research Corporation (PSR), with funding support by DNA, has already provided a great deal of information based on case studies of patients

who received radiation therapy and of accidental exposure victims, documentation of results of atomic bombings of Japan, and recently collected data from the medical and radiobiological communities. Those data have established a relatively clear picture of the symptomatologic characteristics associated with exposure to various doses of radiation over time. The relationship between radiation dose and the nature and extent of resulting physical and physiological symptomatology is now fairly well understood.

However, the relationship between humans suffering from radiation sickness and their physical and mental performance remains largely speculative. Morgan and Cruser [1982] in their review of the literature, were able to find only three studies that directly dealt with the performance effects of irradiation. Furthermore, Anno, Brode, and Washton-Brown [1982] reported that data are not yet available that will permit operational planners to estimate the potential impairment of various types of military units who are exposed to battlefield irradiation in combat. Results from the few existing studies of performance effects of irradiation must be interpreted with extreme caution because of the small number of subjects studied; mainly, patients who received radiation therapy for terminal illness. Generalization of these studies is further limited by the fact that only specific types of performances were measured and only a restricted range of radiation doses were used [Morgan and Cruser, 1982]. Thus, the current sources of data provide little information about the potential effects of radiation upon healthy individuals and are of essentially no value in establishing relationships between irradiation levels and combat effectiveness potential of troops in the field.

Owing to this lack of relevant information, and the fact that applicable combat data cannot be obtained directly through experimentation, the IDP has sought to develop indirect ways of obtaining estimates of the effects of radiation on combat performance. Specifically, in the work reported here, an effort was made to derive estimates of effects upon performance from judgments made by operational military personnel. Experienced soldiers from artillery, armor, and infantry units were asked to indicate how much they would expect different sets

of physical symptoms, induced by exposure to radiation, to degrade performance of a sample of operational tasks. Specific reference to radiation was not made on the actual questionnaire; however, the survey administration made verbal reference to radiation symptoms in the introductory talk.

The principal method used was a survey questionnaire developed by PSR and approved by the IDP Core Group.* Performance estimates were obtained from selected U.S. Army combat team members in the tank, anti-armor, artillery (howitzer), and fire direction center (FDC) occupational specialties. Presented with a set of interdependent tasks that were considered to be critical to the accomplishment of the combat mission, team members were asked to predict the amount of time that would be required to perform each of the tasks when afflicted with each of 30 to 40 concisely described sets of radiation illness symptoms. A normal time, typical of a healthy soldier, was provided as a referent in each instance. The survey was designed to provide estimates of expected operational performance degradations for each task and team member in the combat crew for each specified set of symptoms characteristic of a prompt dose level and time following exposure.

It was anticipated that data from this survey would yield reliable differences in performance estimates as a function of increasing symptom severity. It was also expected that the estimates of effects would differ for different tasks, team members, and crews. The results were to be used as inputs for a mathematical model to be constructed by PSR to predict the degradation of combat unit performance over time and under varying levels of radiation.

*The IDP Core Group is a multidisciplinary resource panel that meets periodically to review, provide expert advice, and suggest future directions for IDP research projects.

SECTION 2

METHOD

Four types of U.S. Army combat teams were selected for this research. They were artillery (155 mm SP howitzer) gun crews, FDC crews, M60A3 tank crews, and antiarmor mounted TOW crews. These combat units were composed of crewmen who performed specific interrelated tasks necessary to complete the operational mission of the team. The FDC team has three crewmen, and the other teams have four members. The choice of these particular army specialties was made because task performance most crucial to the success of their combat missions requires little directly observable time, and the performance of these types of teams are both critical to and typical of general army combat performance.

RESPONDENTS

A total of 161 army noncommissioned officers (NCOs) were administered survey questionnaires in the course of this research. However, data from only 125 of these individuals were included in the analyses reported here. The data from the 16 respondents were not included because they had lower pay grades (E-3 and below), had served for less than 12 months in their technical specialty, or had little or no supervisory experience. They were withdrawn from study in order to ensure that the analyzed responses were from soldiers who were well qualified to make judgments about the performance of tasks in their specialties. In addition, the data from eight respondents were not used because they exhibited ambiguous or uninterpretable response patterns. In all instances, the NCOs who completed the survey questionnaires were made available by their respective unit commands at the request of a planning/liaison person at each of the survey sites.

The career demographic characteristics of the four groups of respondents are presented in Tables 1 through 5: The average number of years in service (Table 1), the percentage of respondents in each pay

grade (Table 2), the average experience in specific crew positions (Table 3), combat experience (Table 4), and supervisory experience (Table 5). As these tables indicate, the tank and TOW crew respondents could be characterized as having had longer time in service, more experience in their specialty, higher achieved pay grades, and longer supervisory experience than the other groups. Appropriate reference should be made to these tables when reading the descriptions of the four respondent groups given below. (All tables in this report follow the text: see p. 57.)

Artillery (155 mm SP Howitzer) Gun Crew

This group was originally represented by 29 NCOs; however, data from eight of the respondents could not be used. The 21 respondents who were retained for data analysis consisted of NCOs in pay grades E-5 through E-7 with a mean of 7.55 years in service and 5.75 years in their specialty. Four individuals reported having combat experience, two with experience in artillery combat. The crew respondent reports of job experience in the four positions of the artillery crews showed an average of 2.43 years as chief of section, 0.87 years as gunner, 0.58 years as assistant gunner, and 0.46 years as loader. Nine personnel (42.7 percent) reported having served in all four positions; 21 (100 percent) reported having served as chief of section; and 17 (95.2 percent), 15 (71.4 percent), and 12 (57.1 percent) had experience as gunner, assistant gunner, and loader, respectively.

FDC

Thirty-three NCOs in pay grades E-4 through E-7 initially took the survey. Of these, 10 crew respondent questionnaires could not be used for reasons stated above. The mean times in service and in specialty for this group of 23 crewmen were 5.16 and 4.54 years, respectively. Three of these personnel reported previous combat experience, but none in their specialty.

This crew is composed of three positions--the fire direction officer (FDO), horizontal control operator (HCO), and computer.* Commissioned officers serve as FDOs. Our demographic data were obtained only from NCOs; hence no FDO entries appear, although the NCOs were asked to provide performance estimates for the FDO. Fourteen respondents (61 percent) reported having served as both HCO and computer; whereas, 18 (78 percent) reported having experience as HCO and 20 (87 percent) as computer. The mean times served in HCO and computer positions were 0.97 and 1.95 years, respectively.

Armor (Tank Crew)

This group was composed of 40 NCOs in pay grades E-6 and E-7, all who met the criteria for inclusion in data analysis. The mean time in service and time in armor specialty was 10.08 and 9.25 years, respectively. Seven of these individuals had combat experience, but only one had engaged in armor combat.

Sixteen crew respondents (40 percent) reported having served in all four positions in the tank crew at some time during their army service. Furthermore, all personnel reported having previously served as tank commander, 33 (82.5 percent) as gunner, 22 (55 percent) as loader, and 22 (55 percent) as driver. Job experience within the four crew positions ranged from 2 to 11 years. At the time of survey administration, the majority of armor crew respondents were serving as tank platoon, company, or section sergeants. Others were assigned as drill sergeants, basic or advanced technical course instructors, or systems maintenance officers. Three were U.S. Marine Corps (USMC) personnel engaged in cross-specialty training.

Antiarmor (Mounted TOW)

Forty-one individuals of this group were surveyed, and all their responses were retained for analysis. Their pay grades were E-6 and E-7,

*The crewmember performing calculations with a hand-held calculator is referred to as the "computer."

and the mean time in service and in specialty was 11.27 and 7.00 years, respectively. Sixteen personnel reported having combat experience, with three having experience in antiarmor. A mean of 3.33 years had been served as squad leader, 0.49 years as gunner, 0.27 years as loader, and 0.25 years as driver. Nine respondents (22 percent) reported having served in all four crew positions at some time during their antiarmor experience. Furthermore, 39 (95 percent) reported having experience as squad leader, 23 (56 percent) as gunner, 12 (27 percent) as loader, and 10 (24 percent) as driver.

SURVEY INSTRUMENTS

Four questionnaires, one for each team, were used to collect the data. Each questionnaire consisted of (1) a demographic information section, (2) introductory pages that provided instructions about the types of tasks to be rated, and examples of the rating format, and established a combat scenario, (3) a sample response sheet, and (4) 30 to 40 symptom complex task performance sheets. A complete example of a questionnaire is given in Appendix A. Each symptom complex page contained a description of a set of sickness (radiation) symptoms followed by a list of selected military tasks performed by each crewmember on the specific team being studied. Figure 1 describes symptom complex 334231 given on a page from one of the four questionnaires administered to the TOW crew.

Symptom Complexes

Symptom complexes consisted of descriptions of radiation sickness syndromes made up of six symptom components of different levels of severity. These six symptom components were (1) upper gastrointestinal distress, (2) lower gastrointestinal distress, (3) fatigability/weakness, (4) hypotension (and associated symptoms), (5) hematological (infection and bleeding), and (6) a group of symptoms associated with fluid loss and electrolyte imbalance. Each of the six symptom components contained five specific symptom levels of severity. Descriptions of the symptom complexes were formed by selecting one symptom description (representing

SYMPTOM COMPLEX 334231

Nauseated; considerable sweating; swallows frequently to avoid vomiting; occasional diarrhea and cramps, defecated several times and will again soon; very tired and weak; slightly light-headed; joints ache, considerable sweating; moderate fever; does not want to eat; sores in mouth/throat.

CREW TASKS

TASKS CREWMEMBER	The usual time for each task is about:	How long do you think it would take a crewman to do each task if he had these symptoms:		
		No increase in time	Amount of time (sec)	Could not do it at all
<u>SQUAD LEADER</u>				
Designate azimuth and target	4 sec			
Command driver to firing position	2 sec			
<u>GUNNER</u>				
Set superelevation, erect, slew 170 to 10 deg azimuth	17 sec			
Adjust magnification, acquire targets, identify, arm, and fire	7 sec			
<u>DRIVER</u>				
From standstill, drive forward 60 ft and stop	20 sec			
<u>LOADER</u>				
Reload	60 sec			
Rearrange ready rack	60 sec			

Target Tracking Accuracy

Estimate the chance of staying on target during the last 6 sec of flight (usual chance 90%) _____ %

ORDINARY TASKS

Climb two flights of stairs briskly	15 sec			
Lift five heavy boxes of books from the floor to a 3 ft high table	20 sec			

- How many flights of stairs could a crewman climb quickly before becoming breathless? _____ flights
- How long could a crewman keep walking at a brisk pace before his legs get tired? _____ minutes
- How many heavy boxes could a crewman keep lifting from the floor to a table before he would have to stop and rest? _____ boxes
- How long would it take a crewman to open a simple 3-number combination lock? _____ seconds

How much confidence do you have in your estimates?

1 None	2 Not Much	3 Some	4 A lot	5 Certain
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Figure 1. Description of symptom complex 334231 and sample page from TOW crew questionnaire.

some specific symptom severity level) from each of the six symptom components. For example, in Fig. 1, the symptom complex described is given the number 334231, which combines severity level 3 of upper gastrointestinal distress, level 3 of lower gastrointestinal distress, level 4 of fatigability/weakness, level 3 of hypotension, level 3 of infection and bleeding, and level 1 of fluid loss category. Appendix B contains the set of symptom categories and descriptions for each symptom component from which symptom complex descriptions were formed.

A set of 30 symptom complexes was selected from 15,625 possible combinations of the five levels of the six symptom components as the outcome of several planning and pilot testing sessions held in concert with PSR staff during the period from September to October 1982 at the test sites, and consultations with the IDP Core Group. These symptom sets were considered to be representative of the range of severity levels of radiation sickness, and the particular symptom combinations could be associated with specific radiation doses and times after exposure. These 30 symptom complexes were used in all questionnaires. In addition, questionnaires given to TOW respondents had ten other symptoms relevant to PSR for study because of their link to important dose and time points. Appendix B lists the 40 symptom complexes and their descriptions used in the study.

The order of presentation of the original 30 symptom complexes was the same for all except one subgroup of five subjects. The order was determined by deriving ten sets of three symptom complexes so that each set contained a relatively mild, moderate, and severe complex. The order of presentation for each of these ten sets was then randomized in the survey questionnaire. This same random order was used for all subjects except for five FDC personnel who were given the questionnaire when the researchers revisited Fort Sill in February 1983. The purpose of using a different order during that administration was to enable a test of potential order effects, but the small size of the group available at that time precluded this test. The additional ten symptoms used for TOW respondents were presented in a random order following the 30 standard symptoms.

Tasks

Below the symptom description on each response sheet was a list of the key military tasks performed by each crewmember. The tasks were the same within each crew but differed between crews. For each task a normal time was listed to provide a standard point of reference--i.e., the time required for completion of the task under normal (symptomless) conditions. These normal times were derived from field observation, technical operations manuals, and expert judgment. The respondents were instructed to refer to the normal time and make a judgment concerning the potential effect of each symptom complex on the performance of each task. Specifically, they were given response alternatives to indicate their belief that either (1) no change would occur in the time required for task completion, (2) the task could not be accomplished at all, or (3) the task would take longer than usual to accomplish. In the third instance, respondents were asked to give their best estimate of how long it would take for a crewman with the symptoms shown at the top of the page (see Fig. 1) to complete the task. Table 6 lists the tasks and referent times for each crew.

In addition to time-referenced tasks, questionnaires given to the mounted TOW crew included the question "Estimate the chance of staying on target during the last 6 sec of flight." Since the antitank weapon is optically guided, this question was considered to be a valid measure of operational performance.

Six ordinary, or nonmilitary, tasks were also presented (see Fig. 1). Referent times were presented for two of these tasks, which required responses similar to the military tasks. The remaining four ordinary tasks did not list a normal referent time and required open-ended responses of symptom effects, although the respondents were asked to supply an estimate of their own referent times for each of the four tasks at the beginning of the questionnaire. Finally, for each symptom complex, respondents rated their confidence in the responses made on each page for each symptom complex, based on a five-point scale.

PROCEDURE

Four army training sites were visited during the period of November 1982 through February 1983 for questionnaire administration. Artillery gun and FDC crews were met at Fort Sill (8 to 10 November 1982 and 3 to 4 February 1983), armor tank crews at Fort Knox (12 November 1982), and antitank crews at Fort Benning (13 January 1983). The questionnaire was administered to groups of 4 to 44 individuals, depending on availability of personnel at each survey site. Training classrooms and conference rooms were used for survey administration. Each session included a formal briefing followed by questionnaire administration, which was approximately 2.5 hr in duration.

Each session began with the introduction of the questionnaire administrator, followed by a 20-min-long formal presentation discussing the purpose of the questionnaire and its potential usefulness, as well as giving assurance of the confidentiality of responses. After this, the instructions contained in the questionnaires were read aloud by the administrator and the respondents were instructed to first complete the demographic data page.

Then, a mission statement and combat scenario was presented for each crew. This statement specified that the crew, who were all considered to be well trained, experienced in combat, motivated, and well led, had been exposed to radiation from a low-yield nuclear weapon without mission-oriented protection posture (MOPP) gear. It further specified that crewmembers were beginning to experience the symptoms listed at the top of each response sheet, and that the crew was now required to proceed with its stated combat mission.

Following this specific scenario presentation, the sample response page was explained on a task-by-task basis by the administrator, who emphasized the need for quality responses, being careful to make sure that the respondents understood the nature of the symptoms and responses required of them.

Revisits

Subsequent visits were made to each test site during January and February 1983. These follow-up visits provided the opportunity for obtaining additional information from each group of respondents (see Appendix C).

SECTION 3

ANALYSES AND RESULTS

The analyses of the questionnaires focused on determining the degree of impaired task performance attributed to the various symptom complexes described. For each questionnaire, four general questions were addressed. These questions were:

1. For each symptom complex, what percent of respondents reported that task performance would (a) not be affected (no increase in time of completion), (b) be degraded (time to complete the task increased), and (c) not be performed at all (incapacitated).
2. For each symptom complex, what were the average performance times?
3. What degree of individual response consistency across symptoms for task, positions, and crews was evidenced?
4. What were the self-confidence ratings of individuals for their questionnaire responses (based on a five-point scale)?

CALCULATION OF EXPECTED DECREMENT MEASURES

Three measures were calculated from the data in order to infer the expected degradation by symptom effects: (1) the percent of responses in the unaffected category, (2) the percent of responses in the incapacitated category, and (3) the percent of responses in the degraded performance category. The first two measures were based on the frequencies of responses in the no effect and cannot do categories, respectively. The third measure was calculated from all responses (including the responses from the no effect and cannot do categories) and used the referent or normal time, or other values as its basis.

Percent of Responses in Unaffected and Incapacitated Categories

The first two measures reflect the frequencies of response to estimating performance at the extremes of the continuum. For the military

tasks, and the two ordinary tasks with the three-category response format, the percent of responses in the unaffected category was determined by dividing the number of checks in the no effect category by the total number of responses across all three categories.

In calculating these effects for team positions, all of the responses of a given respondent for all tasks within a position were required to be in the no effect category and classified as unaffected. Whereas, the percent of responses in the incapacitated category was calculated by dividing the number of responses in the cannot do category by the total number of responses.

For several positions, the inability to perform at least any one of the several tasks was considered reason for classifying the crewman in that position as incapacitated. That is, the serially dependent and highly interrelated nature of the tasks comprising these positions would make it impossible to function in a given position without the ability to perform all of the several component tasks. These positions were the gunner, assistant gunner, and loader in the artillery gun crew; the HCO and computer in the FDC crew; and the gunner in the tank and TOW crews.

Percent of Normal Performance

The percent of normal performance provided a measure of symptom effects that varied between 0 percent (total incapacitation) and 100 percent (normal performance). Its calculation is based on a ratio of the normal expected time of performance to the expected performance time under each illness condition.

As discussed previously, for each of the military tasks a normal time for performance was given as a referent for making judgments. All of the types of military tasks on the questionnaire, except one, asked for a response regarding the time needed to complete the task under the various sickness conditions. The time referents for these tasks were noted, in units of seconds. The exception was tracking accuracy on the TOW questionnaire, which was based on a usual referent of 90 percent chance of tracking the TOW missile over the last 6 sec of flight. Two of the six ordinary tasks also listed a normal time of completion, as above. For the other four tasks without a standard, the referent was

determined for each respondent from his responses. To obtain the base figures, the respondents in the TOW group and respondents in the last round of data collection on the FDC questionnaire were asked to supply the referent values for each of the tasks--What would be the typical performance of a normal, healthy soldier? For the other respondents who did not provide these data, the highest expected performance value assigned for each task by each respondent under illness conditions was used as the referent.

Expected degradations for all tasks were calculated by dividing the referent value by the expected performance for each subject under each sickness condition. These proportions were multiplied by 100 to obtain the percentage of normal performance. When the categories of no effect or cannot do were checked, the expected degradation was calculated as 100 and 0 percent of normal performance, respectively. As suggested by the IDP Core Group, the obtained decrements for the military tasks were adjusted on a task-by-task basis by dividing each individual's performance rating by his expected performance to symptom complex 112111 (somewhat tired with a mild weakness). The rationale for this operation was to adjust for the individual differences in estimation among respondents by synchronizing their responses to a common point of origin. The symptom complex 112111 was used on the assumption that healthy soldiers engaged in a battle would normally experience symptoms of mild fatigue. For example, if the referent time was 5 sec and the estimated time was 8 sec, the expected performance decrement would be 62.50 percent. If the decrement obtained for symptom complex 112111 was 75.00 percent, the adjusted percent of normal performance would be 83.33 percent. In a few instances, expected performances greater than 100 percent resulted from this operation because the responses to symptom complex 112111 were greater than the response to another symptom. When this occurred, the ratings were coded as 100 percent. No correction was made in the ordinary tasks because, for the most part, the expected effects were already based on individually determined referents.

RESPONSE CONSISTENCY

Two analyses were conducted to test the degree of consistency among

the tasks within each position, and consequently to determine the feasibility of combining the individual task performance estimates into position performance estimates. To the extent that, within symptom complexes, respondents order-estimated performance of the tasks of a given position in a similar manner, analysis of positions can provide estimates of performance that are reasonably consistent with the analysis of separate tasks. On the other hand, if the tasks within a given position were perceived to be affected differentially within symptom complexes, the task should be considered separately.

In the first analysis, the percentages of normal performance for the tasks within each position were correlated for each symptom complex using internal consistency analysis procedures. Guilford [1954] computed simple Pearson correlation coefficients for positions that consisted of two tasks. Cronbach's alpha [Cronbach, 1951] was calculated by Guilford for more than two tasks. These internal consistency estimates were then averaged across symptom sets.

Table 7 summarizes the results of the intertask consistency analyses. The column labeled average correlation (raw) presents the internal consistency estimates that were obtained for the tasks within positions, and the averages across positions within crews. To facilitate comparisons between the internal consistency estimates of different crew positions, the raw average coefficients were adjusted by means of the Spearman-Brown correction formula [Guilford, 1954], to reflect the estimated internal consistency that would be expected with five items.

Across positions within crews, the coefficients generally were high. Across the four crews the mean raw coefficient was 0.79 and the adjusted coefficient was 0.88. In two positions (FDC computer and tank loader), the obtained and adjusted correlations appeared to be substantially lower than for the other positions. This suggests that the respondents may have perceived that the level of these task performances would not covary as much as others within illness conditions. Because the target tracking task for the TOW gunner position only correlated 0.49 with the other two tasks, it was not used in the position analyses reported in Table 7 or in later sections.

The second analysis of response consistency examined the agreement in the rank order of expected estimates of performance across the sets of symptoms. The relative magnitude of symptom effects across tasks within positions suggests that there is a high degree of consistency in the perceived order of symptom effects at the task level (see also Appendix D). Agreement in the relative severity of symptom complexes is also reflected in Tables 8 through 11, which present the mean expected performance degradation for crewmembers, averaged across tasks, affected by each symptom complex. Table 12, which lists the 30 symptom complexes by rank order of increasing severity, computed across the expected performance of crewmen for the four crews, also shows substantial agreement.

The degree of consistency by which symptom sets were rank-ordered (according to the mean estimate of normal performance expected at the task position and crew level) was tested using the coefficient of concordance, Kendall's *W* [Edwards, 1963]. Table 13 summarizes the results of these analyses. Across the tasks within each position, for each of the four crews, the rank order of symptom sets on mean degradation was highly consistent. The average *W*, 0.98, accounted for almost 97 percent of the variance of the rank order. Similarly, across the positions within the various crews and across crews, the rank order of symptoms conformed highly. These results revealed that soldier respondents expected a systematic and general degradation of performance to occur, whether or not considered at the task, position, or crew level, as well as across crews.

RESULTS OF EXPECTED EFFECTS OF SYMPTOM ON PERFORMANCE DEGRADATION

It must be kept in mind that Kendall's *W* statistic [Kendall, 1948] is dealing with the consistency at which symptom sets are rank-ordered with respect to the decrements induced. It does not provide a test for the level of expected effects. For example, even though the order of symptom sets in Table 12 is similar across crews, the absolute amount of expected impairment might differ substantially.

Tables 14 through 17 summarize expected mean levels of task performances for each of four crews. These tables show the percent of

responses in the no effect or unaffected category, the percent of responses in the cannot do or incapacitated category, and average estimated performance decrement (percent of normal performance, 100 percent) for each task performed by each crew. These data, and the more specific breakdown of the task and symptom means given in Appendix D, indicated that respondents expected some differences in task performance for the different positions. However, the results of the two consistency analyses indicated that within and across symptom complexes the estimates for tasks in each position, with the exception of the tracking task, were internally consistent. Therefore, this section will focus on the results of analyses conducted across the four crews, and across positions within crews, based on the three measures of expected degradation discussed previously.

Table 18 presents the mean percent of normal performance for combined crew performance across the 30 symptom sets common to all crews, in order of increasing severity for all crews. Means used in Table 18 were computed by averaging across all positions rated. The means are also depicted in Fig. 2 for ease of comparison among crews.

As shown in Fig. 2, the average crew performance generally displayed a similar degree of degradation across symptom complexes. Except for symptom complex 112111, which was used as a control point of origin (100 percent) for these analyses, the mean performance across crews varied between 93.55 and 22.15 percent of normal performance for the symptom complexes perceived as least (113111) and most (415314) severe. The performance of the PDC was estimated to be somewhat less affected at moderate and severe symptom intensity levels than the other three crews, which consistently overlapped across the sets of symptoms used.

Analysis of the locus of the perceived effects was conducted by regressing mean performance on the integer levels of the six components of the symptom sets, as indicated by the six-digit symptom number. Table 19 summarizes the multiple regression analysis conducted on the combined crew performance across the four crews. Respondent group (type of system) was regressed on the dependent variable first, hierarchically, followed by stepwise inclusion of the six symptom categories.

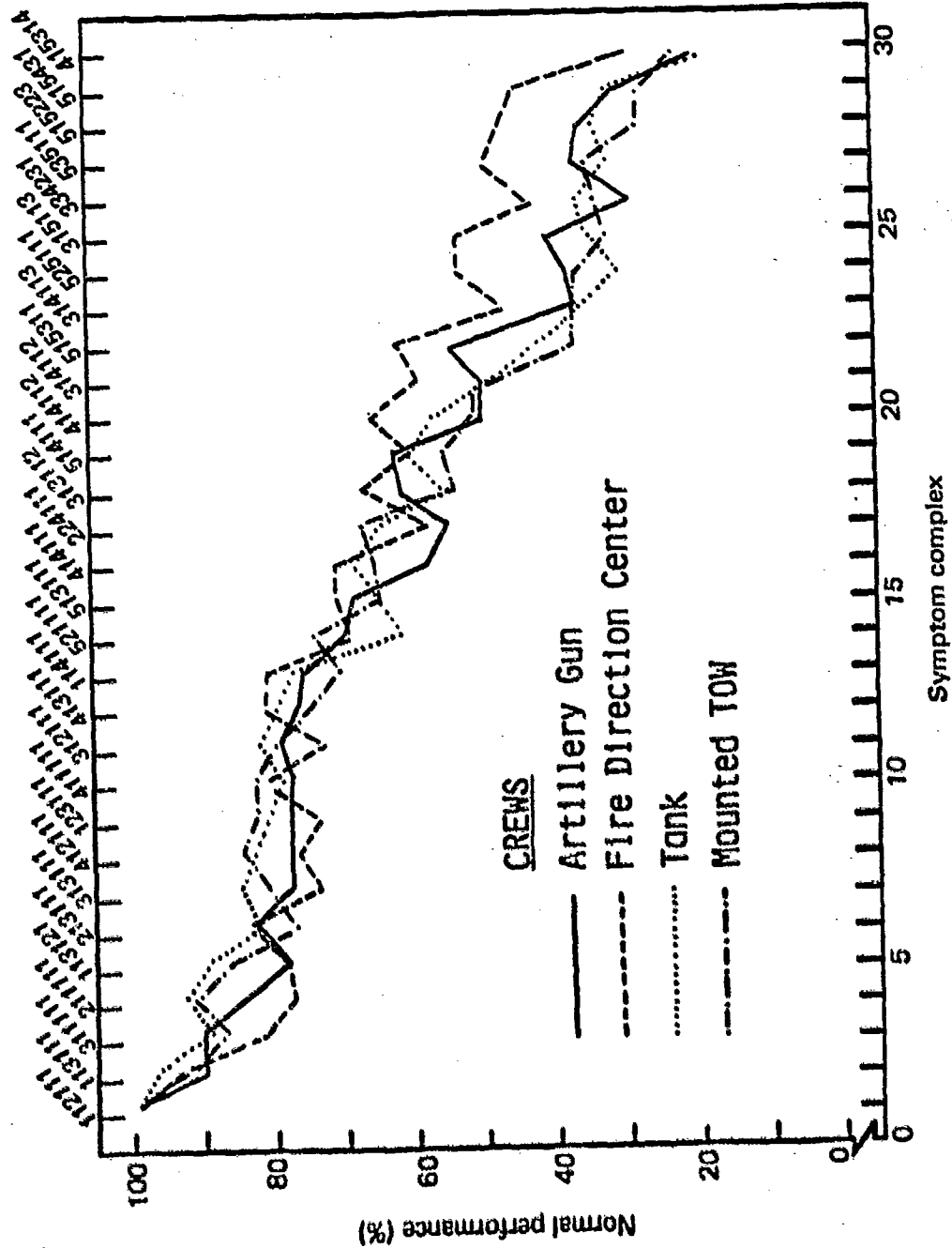


Figure 2. Mean percent of normal performance for crews as function of perceived symptom complex severity across all crews.

As shown in Table 19, all of the predictors added significantly to the results. Fluid loss provided the heaviest weight in the final solution ($\beta = -0.299$), followed, in order of their contributions, by fatigability/weakness, upper gastrointestinal distress, lower gastrointestinal distress, infection and bleeding, and hypotension symptoms. The final equation accounted for approximately 43 percent of the variance in combined crew performance, with a standard error of prediction of 23.89. The standard error can be interpreted as the standard deviation of the dependent variable around the line of best fit. Specifically, it indicates that the expected range of performance is ± 23.89 percent of the predicted value for approximately 66 percent of crews. Although the standard error appears to be somewhat high, it is important to note that this solution was based on 30 of the possible combinations of symptom complexes, and a considerably restricted range of predictor values in all except the lower gastrointestinal distress and fatigability/weakness symptom categories. A more representative sampling within symptom dimensions and across the full range of possible symptom sets would presumably result in a higher multiple correlation and in less error of prediction.

Artillery Gun Crew

The main findings concerning the artillery gun crew are summarized in Tables 20 and 21. For each set of symptoms, Table 20 lists the percent of respondents who judged that performance would be unaffected and the percent who said that the crewmember would be incapacitated. Averaged across all symptoms, the range of responses in the no effect category was between 17.3 and 35.4 percent for all crews.

The chief of section, gunner, and assistant gunner positions were similarly affected; with the loader much more severely degraded as reflected by both measures. For the first three positions, approximately one-third of all the responses were in the no effect category. Also, excluding the control symptom set 112111, the percent of no effect response ranges were 4.76 to 71.43 percent for the chief of section, 0 to 85.71 percent for the gunner and assistant gunner, and 0 to 61.91 percent for the loader. These results indicated that a substantial

portion of the respondents believed there would be some performance degradation at all positions even with relatively mild illness symptoms. A similar conclusion is reflected in the data for responses in the incapacitation category. As shown in Fig. 3, the percent of respondents who indicated that the loader could not perform were substantially higher than the percent for other positions. Across all symptoms, 30 percent of all responses indicated that illness would incapacitate the loader, as compared with approximately 13 percent for the other positions. A review of the data for specific symptom complexes (see Table 20) indicates that the majority of symptom sets were judged to have little or no incapacitating effect on the chief of section, gunner, or assistant gunner positions. However, this was not the case for the loader.

In contrast, the effect of several symptom complexes was considered to be quite severe for all of the positions. For example, for symptom complex 415314, 61.91 percent of the responses from the first three positions, and 76.19 percent for the loader position, fell into the cannot do category. Such differences reflected the more physically demanding nature of the loader's job, as suggested by the task breakdown in Table 14.

The percent of normal performance was also analyzed for each gun crew position. Table 8 presents the means and standard deviations for each of the positions. The means are also depicted in Fig. 4 for the 30 symptom sets as a function of the overall severity across crews. Excluding the control symptom complex 112111, performance across crewmembers varied between 90.91 percent of normal performance for symptom set 113111 and 19.27 percent for symptom set 415314, with a grand mean of 61.99 percent. The chief of section and loader positions were comparable in terms of expected performance, with the gunner and assistant gunner positions judged as somewhat less degraded. Mean percent of normal performance for the gunner ranged between 95.33 percent for symptom set 113111 and 24.60 percent for symptom set 415314, and for the assistant gunner position the range was from 95.18 to 22.50 percent. For the chief of section, percent of normal performance ranged from 87.80 percent for symptom set 113111 to a low of 17.94 percent for symptom set 415314.

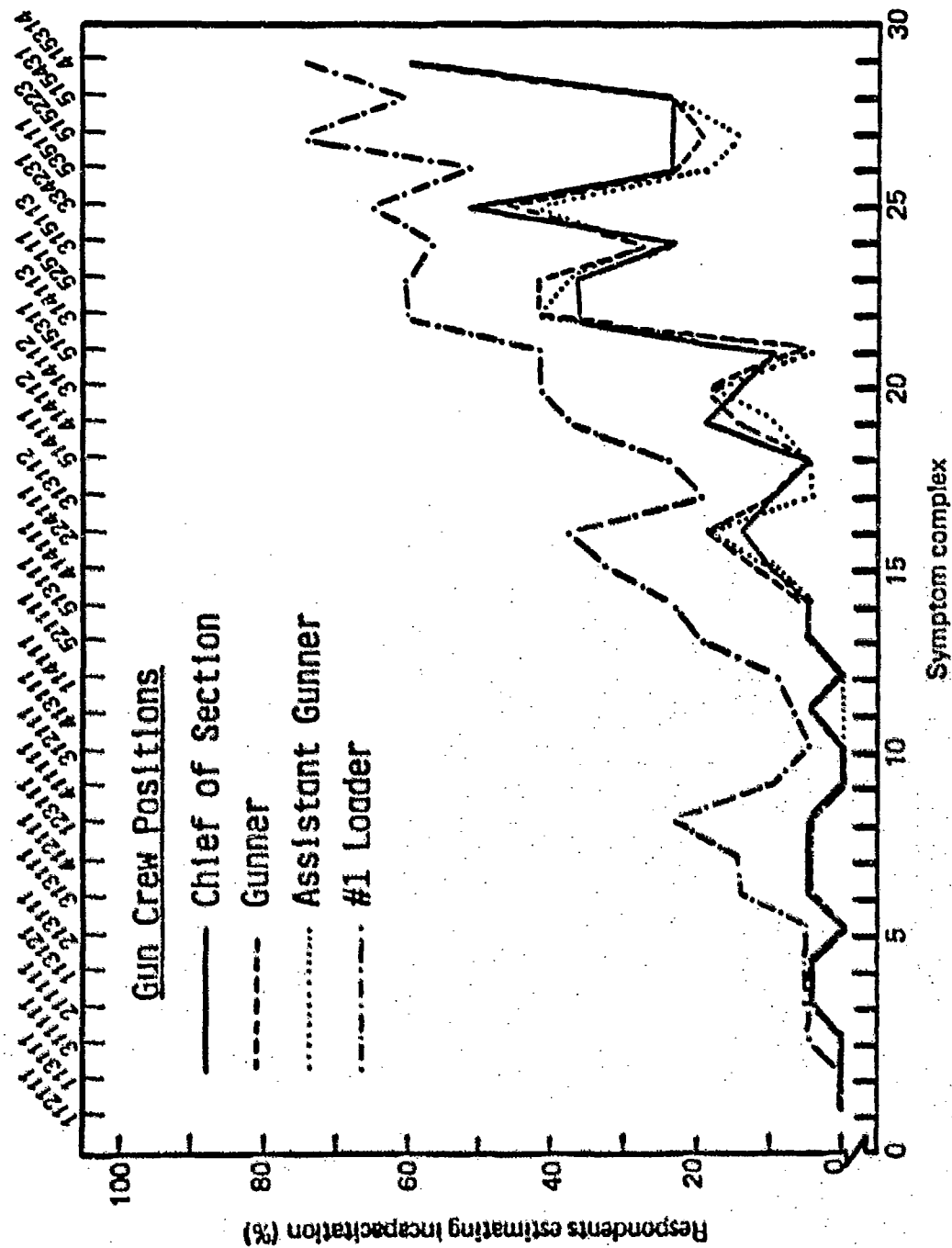


Figure 3. Mean percent of respondents who estimated task performance incapacitation for artillery gun crew positions as function of perceived symptom complex severity across all crews.

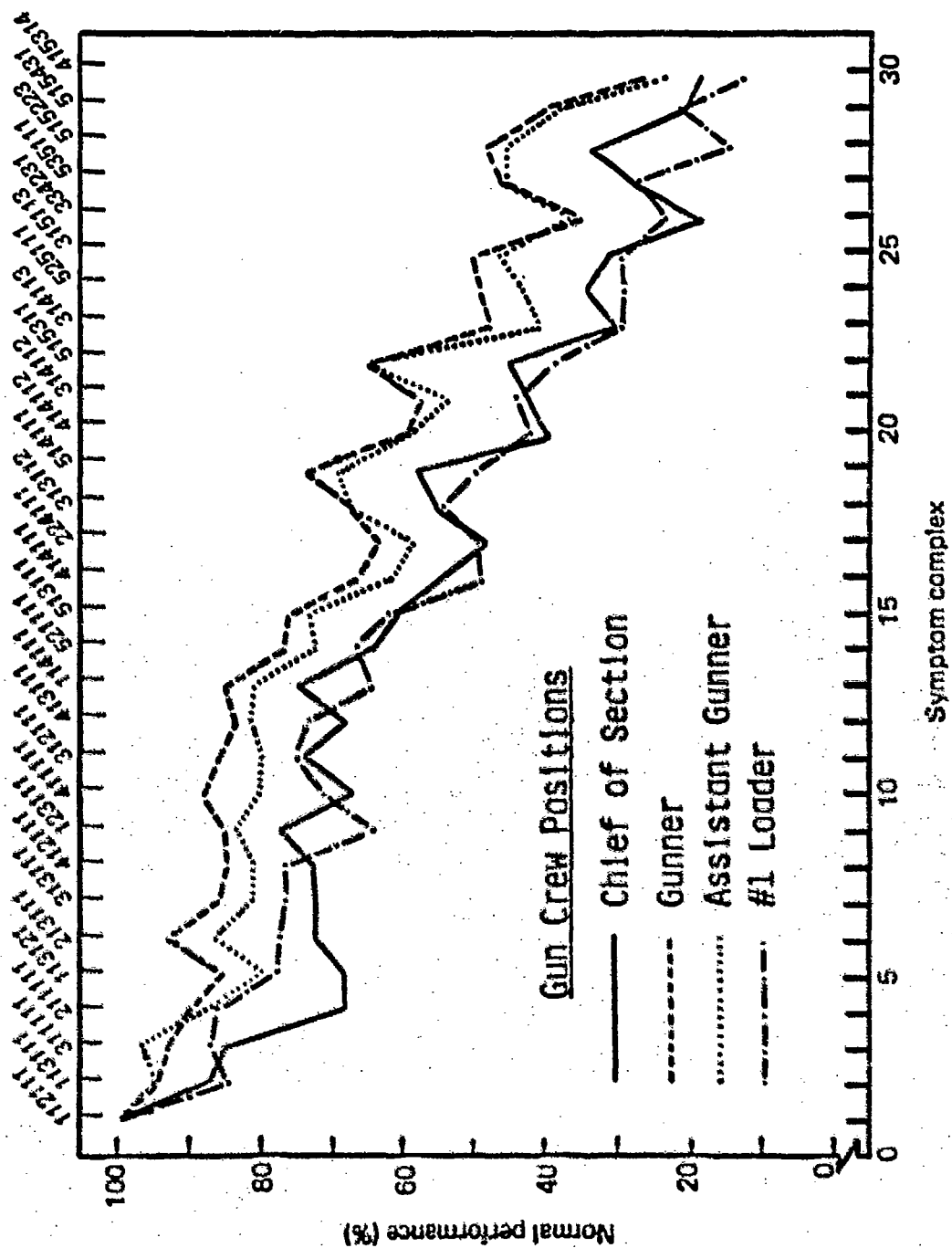


Figure 4. Mean percent of normal performance for artillery gun crew positions as function of perceived symptom complex severity across all crews.

For the loader, the range was between 87.29 percent for symptom set 211111 and 12.04 percent for symptom set 415314.

In comparing the absolute levels of the obtained expected values for the different crewmembers, several points need to be emphasized. As indicated by the size of the standard deviations in Table 8, there was substantial variation among respondents in the expected percent of normal performance at all of the symptom complex levels. In general, given this variability in the data, the difference in expected performance would not be statistically significant. Moreover, artificial differences in size of the obtained decrements may have occurred because of the manner in which the percent of normal performance measure was calculated. As discussed at the beginning of this section, it was based on the ratio between the expected performance and the referent, listed next to each task. Data gathered during the revisits indicated that some respondents believed that not all of the referents were accurate (most often they were said to be too low). Changing the referent value would, of course, change the values of the expected performance reported here.

Regression analyses were conducted for each position, by regressing the six symptom components on the mean percent of baseline performance in a stepwise solution. Table 21 shows the obtained weights for each of the symptom components. For the chief of section and gunner positions, the most important predictor was fluid loss, followed by lower gastrointestinal distress, and fatigability/weakness. For the assistant gunner position, fluid loss, fatigability/weakness, and lower gastrointestinal distress, in that order, were the best predictors. For the loader, fatigability/weakness was the most important predictor, followed by fluid loss and lower gastrointestinal distress. Hypotension and infection and bleeding contributed little to any of the predictive equations. The R^2 values (global goodness of fit measures of data), and standard errors were similar across positions, as shown in Table 21. The amount of variance accounted for by the regression ranged between 28 and 30 percent, with error of prediction of the measure between 28.12 and 33.62 percentage points.

FDC

Analyses of the FDC crew are summarized in Table 22 and Fig. 5. Table 22 presents the percent of respondents who rated each position at each symptom complex in the no effect or cannot do categories. Across the three positions for all symptom complexes, 18.93 percent of all responses were in the no effect category. The FDO performance generally was judged to be less affected by the symptoms than the other two positions. For the control symptom complex, less than 30 percent of the respondents indicated that there would be no effect. This suggests that the FDC respondents believed that even relatively mild radiation illness will result in degraded performance.

In terms of the percent of responses in the cannot do category, both Table 22 and Fig. 5 indicate that only a relatively small percent of respondents judged that performance would be totally degraded for FDC positions, except by the most severe symptoms. Across all symptoms, the total percent of responses in the cannot do category averaged less than 6 percent, and there were only 4 instances out of the total of 90 (i.e., total of responses for all three positions) that exceeded 20 percent.

Table 9 presents the mean and standard deviations for the percent of normal performance. Across all symptoms, the average performance was expected to be approximately 67 percent of normal. Excluding the control symptom set 112111, performance for the FDO position varied between 24.42 and 92.89 percent of normal performance, while for the HCO and computer positions, the ranges were 31.73 to 95.75 percent and 27.72 to 91.72 percent, respectively. In Fig. 6, the means for these positions overlapped considerably across the symptoms. Given the amount of variation in estimates (Table 9), the results suggested that all positions are affected substantially and to the same degree by the symptom sets sampled.

Multiple regression analyses were used to estimate the relative effects of the specific components on mean percent of normal performance. Table 23 summarizes the analysis for each position, showing the obtained beta weights for the component predictors, adjusted R^2 values, and standard error of prediction. For all positions, fluid

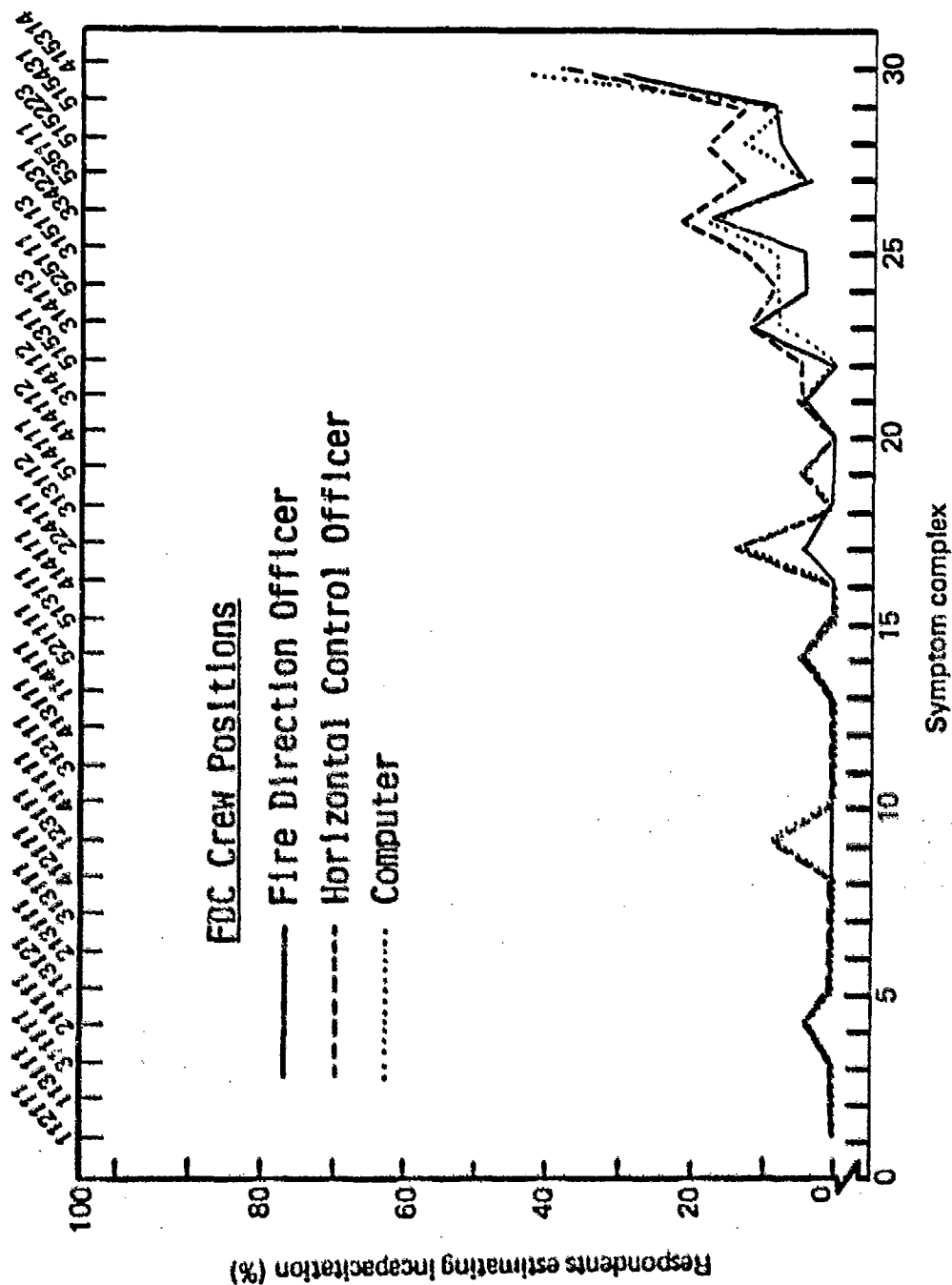


Figure 5. Mean percent of respondents who estimated task performance incapacitation for FDC crew positions as function of perceived symptom complex severity across all crews.

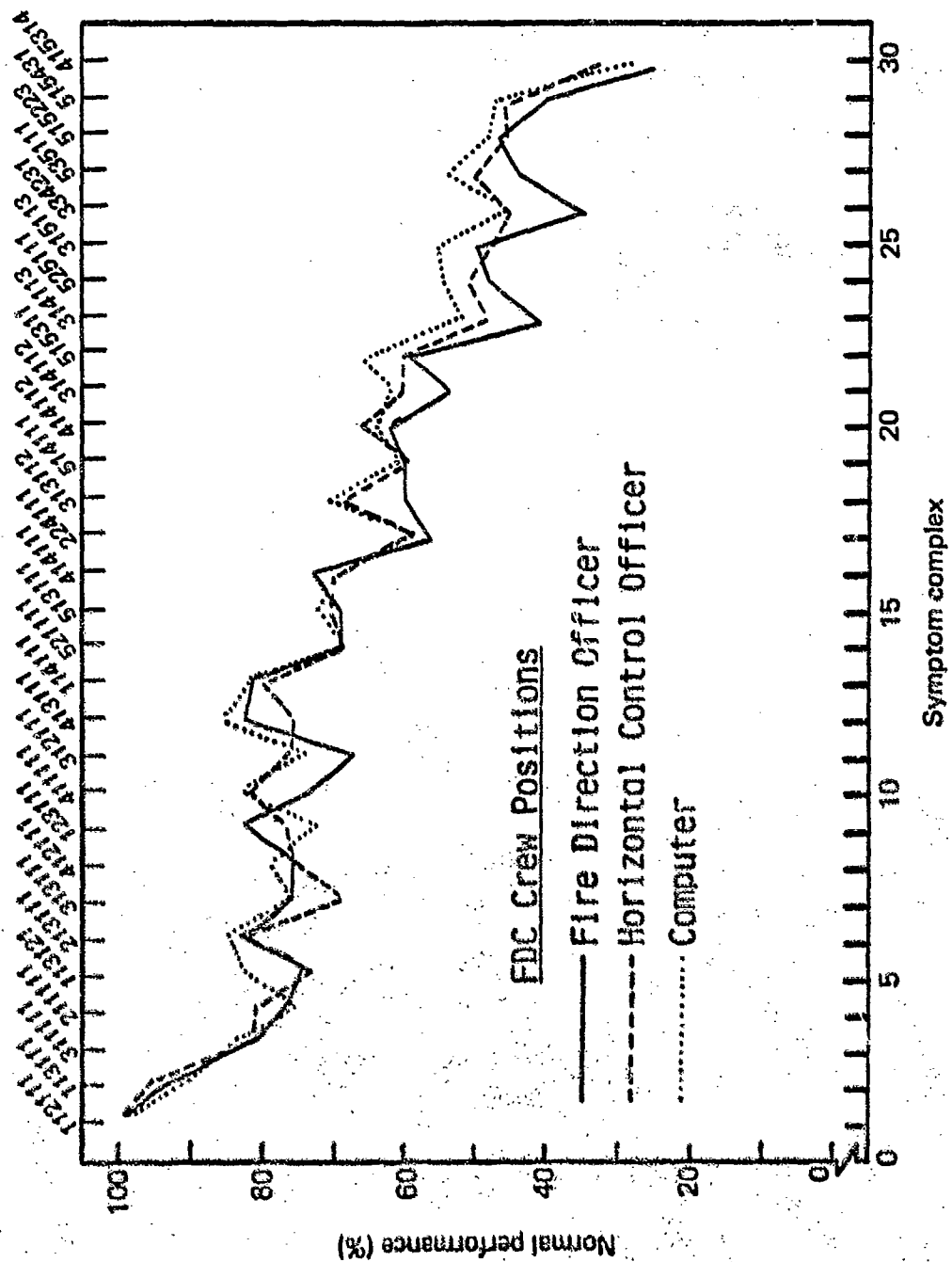


Figure 6. Mean percent of normal performance for FDC crew positions as function of perceived symptom complex severity across all crews.

loss contributed most to the prediction, followed by lower and upper gastrointestinal distress. Although adding significantly to the amount of variance accounted for in the equation, fatigability/weakness and hypotension were substantially weaker component predictors. In two of the three analyses, infection and bleeding were unrelated. The equations obtained accounted for 30 percent of the variance in the FDO position, 23 percent in the HCO position, and 27 percent in the computer, with standard errors in the range of 22.40 to 24.97 percent.

Tank Crew

The analyses conducted for the tank crew positions are summarized in Tables 24 and 10 and Figs. 7 and 8. The percent of responses in the no effect and cannot do categories are given in Table 24. Across all symptom sets, about 30 percent of all responses were in the no effect category. For the particular positions, the percent of respondents who judged that there would be no effect varied considerably with the perceived symptom complex severity. The ranges (excluding the control symptom set) were between 0 and 82.5 percent for the tank commander, 0 and 85 percent for the gunner, 0 and 77.5 percent for the loader, and 2.5 and 92.5 percent for the driver. The driver was perceived to be more resistant to the effects of radiation illness symptoms than the other positions, which were fairly comparable to each other.

In terms of the percent measurement of incapacitation, approximately 14.5 percent of the responses fell into this category across all symptoms and positions. As shown in Fig. 7, little difference was perceived between positions. For the milder symptoms, incapacitating effects were minimal and only for two of the more severe symptoms did more than 40 percent of respondents choose this category.

Table 10 presents the results of the mean percent of normal performance for each position across the 30 symptom complexes. As shown in Fig. 8, only minor differences were expected to occur across the positions. Across all positions and symptoms, an average expected decrement was 63.15 percent. The obtained means are linear across symptom severity. For the tank crew commander, performance estimates varied between 16.59

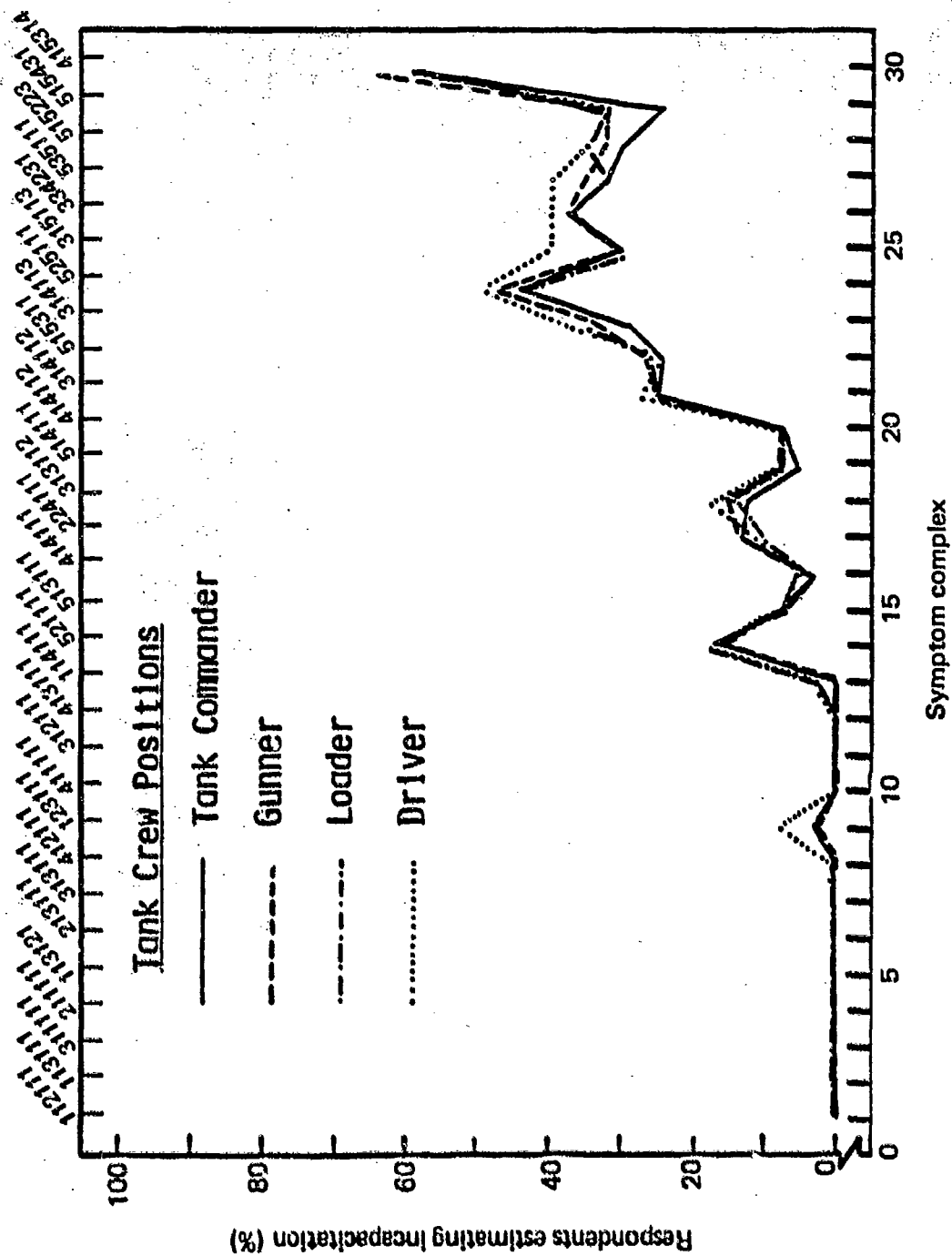


Figure 7. Mean percent of respondents who estimated task performance incapacitation for tank crew positions as function of perceived symptom complex severity across all crews.

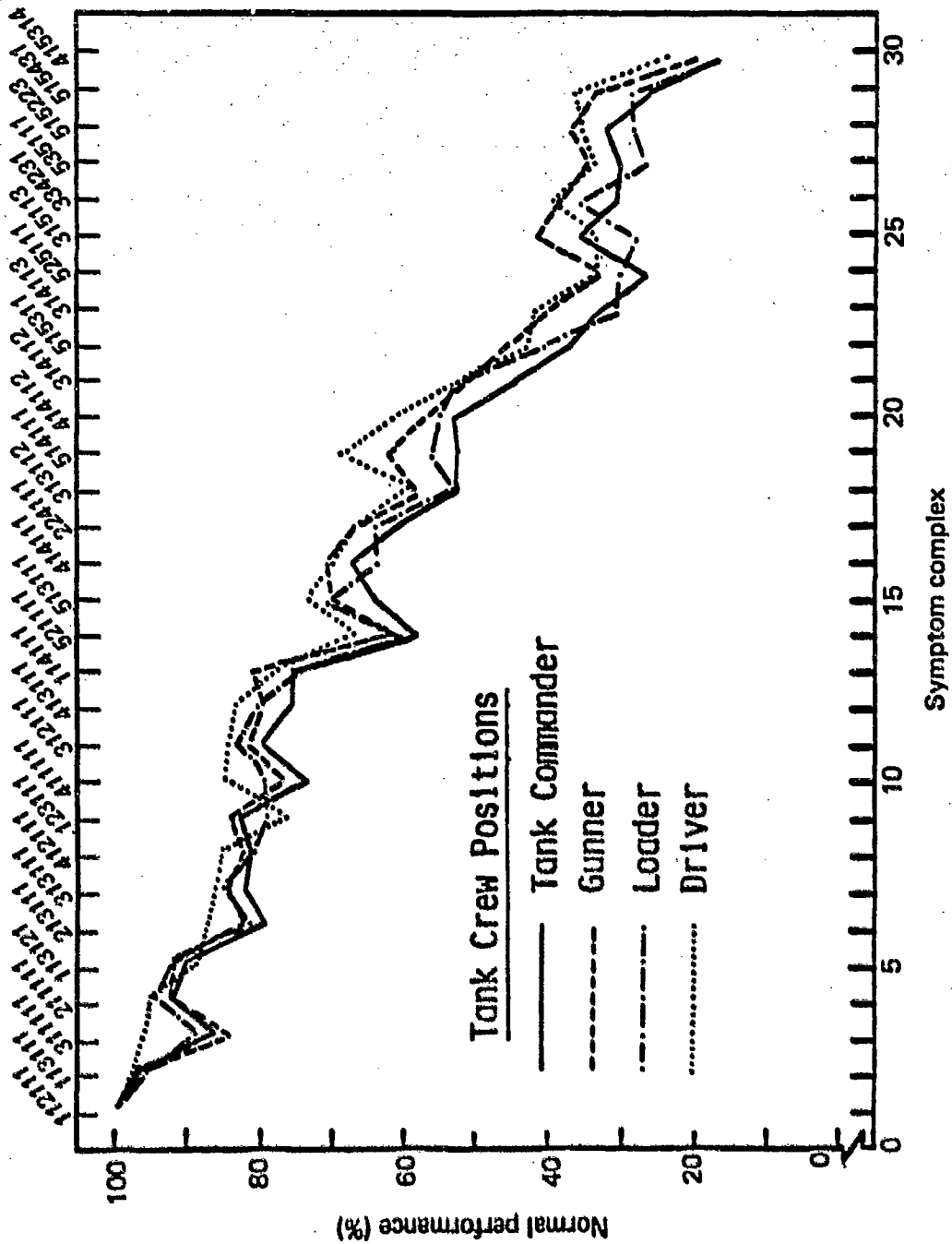


Figure 8. Mean percent of normal performance for tank crew positions as function of perceived symptom complex severity across all crews.

percent for symptom complex 415314 and 97.64 percent for symptom complex 113111, with a mean of 60.57 percent. Estimates for the gunner position varied between a low of 17.67 percent for symptom complex 415314, and 96.95 percent for symptom complex 113111, with a mean across symptoms of 64.49 percent. For the loader positions, the estimates ranged between 16.37 percent for symptom complex 415314 and 96.63 percent for symptom complex 113111, with a mean of 61.46 percent. For the driver the range was from 23.61 percent for symptom complex 415314 to 97.26 percent for symptom complex 113111, with a mean of 66.07 percent. For all positions, the size of the standard deviations indicated that different respondents viewed the expected effects of the radiation illness symptoms quite differently.

Table 25 shows the multiple regression analysis results of symptom components performed on the mean percent of normal performance for each position. The final solutions accounted for approximately 37 to 43 percent of the variance. A few specific differences in the pattern of regression coefficients were observed between positions. The fluid loss variable is the most dominant for all positions, followed by fatigability/weakness for the loader and driver positions and upper gastrointestinal distress for the tank commander and gunner. The hypotension and infection and bleeding components were of relatively little importance in all cases.

Mounted TOW Crew

Results are presented here only for the 30 symptom sets used with all four crews. The data analysis for the 10 items added to the TOW questionnaire have revealed nothing that leads to interpretation other than those based on the original 30 symptom sets. The percent of respondents who judged the performance of the four positions to be unaffected or incapacitated for each symptom complex are given in Table 26. Generally, these data indicated that respondents believed the presence of any set of symptoms would degrade performance of the crewmembers. On the average, approximately 31 percent of all responses were in the no effect category.

The driver position was judged to be most resistant, with 39.54 percent of responses in the no effect category. The range of percentages across symptoms varied between 2.44 percent of responses for symptom complex 415314 and 85.37 percent of responses for symptom complexes 113111 and 211111. For the squad leader position the percent of respondents ranged between 2.44 percent for symptom complexes 515223 and 515431, and 80.49 percent for symptom complexes 113111 and 211111. Overall, 33.43 percent of the responses for the squad leader position indicated that there would be no effect. For the gunner and loader positions, respectively, 25.6 and 24.6 percent of all responses occurred in the no effect category. For the gunner position, the percent of no effect responses varied between 0 percent for symptom complexes 334231 and 515223, and 75.61 percent for symptom complex 211111. For the loader position, the percent of no effect responses ranged from 0 percent for symptom complexes 415314, 515223, 515431, and 535111, to 70.73 percent for symptom complexes 113111 and 211111.

Table 26 and Fig. 9 summarize the results of the other side of the picture: the percent of respondents who believed that performance would not be possible (cannot do category). As suggested by Fig. 9, little difference was perceived between crewmember incapacitation at the 11 mildest illness conditions, but at moderate and severe levels the differences became quite substantial. The percent of respondents who judged that the squad leader would be incapacitated, averaged only 7.02 percent across the symptom complexes. For 19 of 30 symptoms, less than 5 percent of the respondents indicated that the squad leader would be incapacitated and for only three complexes was incapacitation indicated by 20 percent or more of the respondents.

The loader position, on the other hand, was judged as quite severely affected in terms of incapacitation, with a steep increase in percent as symptom complex severity increased. Overall, more than 25 percent of the respondents rated this position in the cannot do category. For 12 of 30 symptoms, at least 30 percent of the respondents judged performance to be incapacitated. The gunner and driver positions

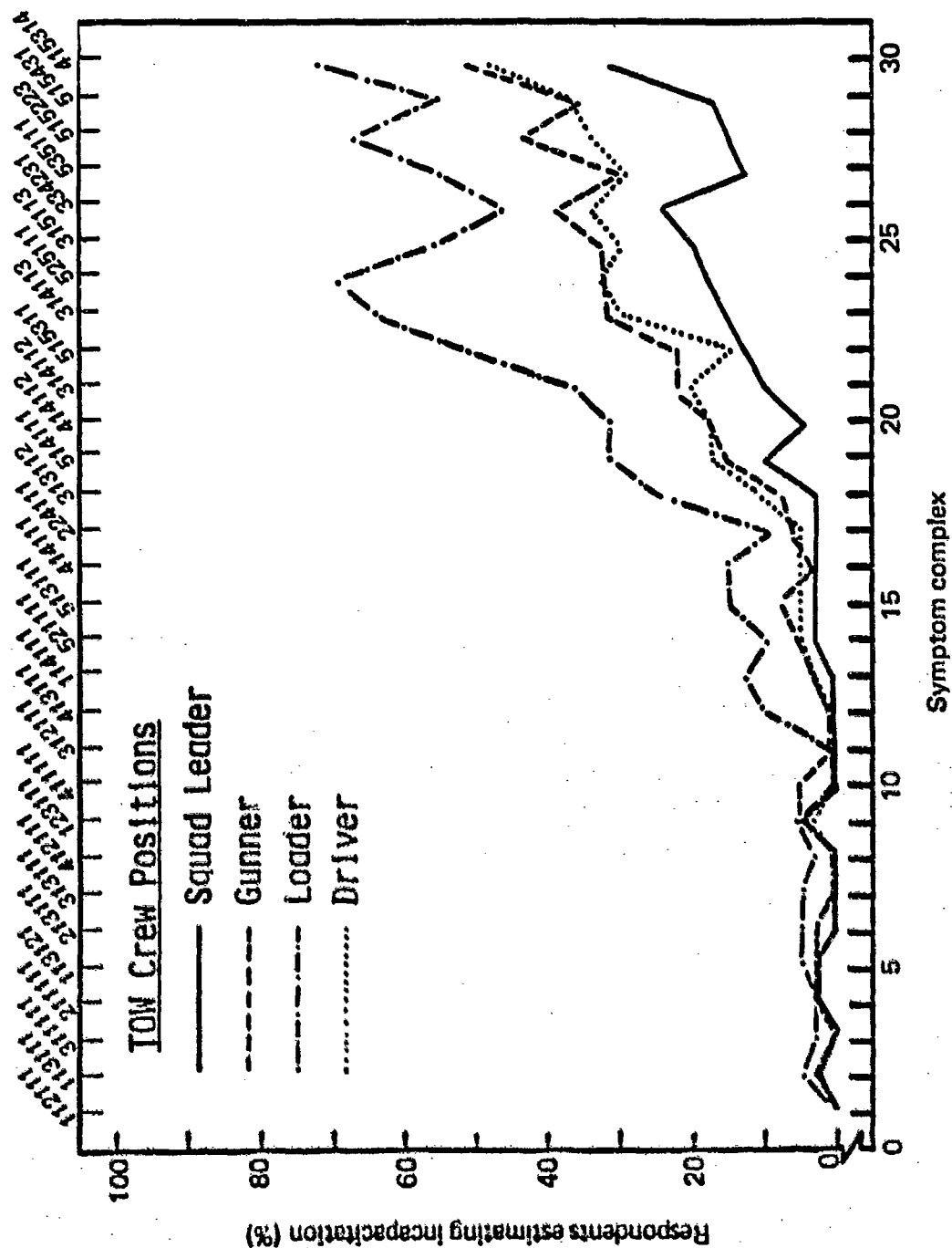


Figure 9. Mean percent of respondents who estimated task performance incapacitation for mounted TOW crew positions as function of perceived symptom complex severity across tasks.

averaged 14.04 and 12.92 percent, respectively, of responses in the cannot do category. For 16 of 30 symptoms, less than 5 percent of the respondents indicated that incapacitation would be produced in these positions. For 10 of 30 symptom complexes the percent of responses in the incapacitated category exceeded 20 percent.

Table 11 summarizes the results of the analyses of the percent of normal performance for the TOW crew. Figure 10 depicts the means for each position across symptom complexes. While some variation between positions is evident, the trend of the position decrements is consistent and linear across the symptom complexes, with an overall average decrement of 61.85 percent. Across the symptom complex set, the driver position exhibited the least decrement, followed by the squad leader, loader, and gunner positions. Excluding the control symptom complex 112111, the mean percent of normal performance varied between 25.22 and 92.36 percent for the squad leader position, 18.27 and 90.95 percent for the gunner, 13.82 and 92.21 percent for the loader, and 29.83 and 95.33 percent for the driver. Again, the standard deviations in Table 11 reveal that there was a wide variation among respondents in the expected effects.

Table 27 presents the summary of the regression analysis for each position. Across all the analyses, the final solutions accounted for 33 to 42 percent of the variance. As in the other crews, the symptoms related to fluid loss and fatigability/weakness were most predictive of the decrement, followed by upper and lower gastrointestinal distress. The hypotension and infection and bleeding predictors generally contributed small but significant amounts of additional explained variance. Interestingly, in the loader position, in which 42 percent of the variance was explained, fatigability/weakness symptoms were substantially more important than other predictors.

ORDINARY TASK ANALYSIS

The six ordinary tasks included on the questionnaire were subjected to analyses similar to those described above. These tasks are identified as:

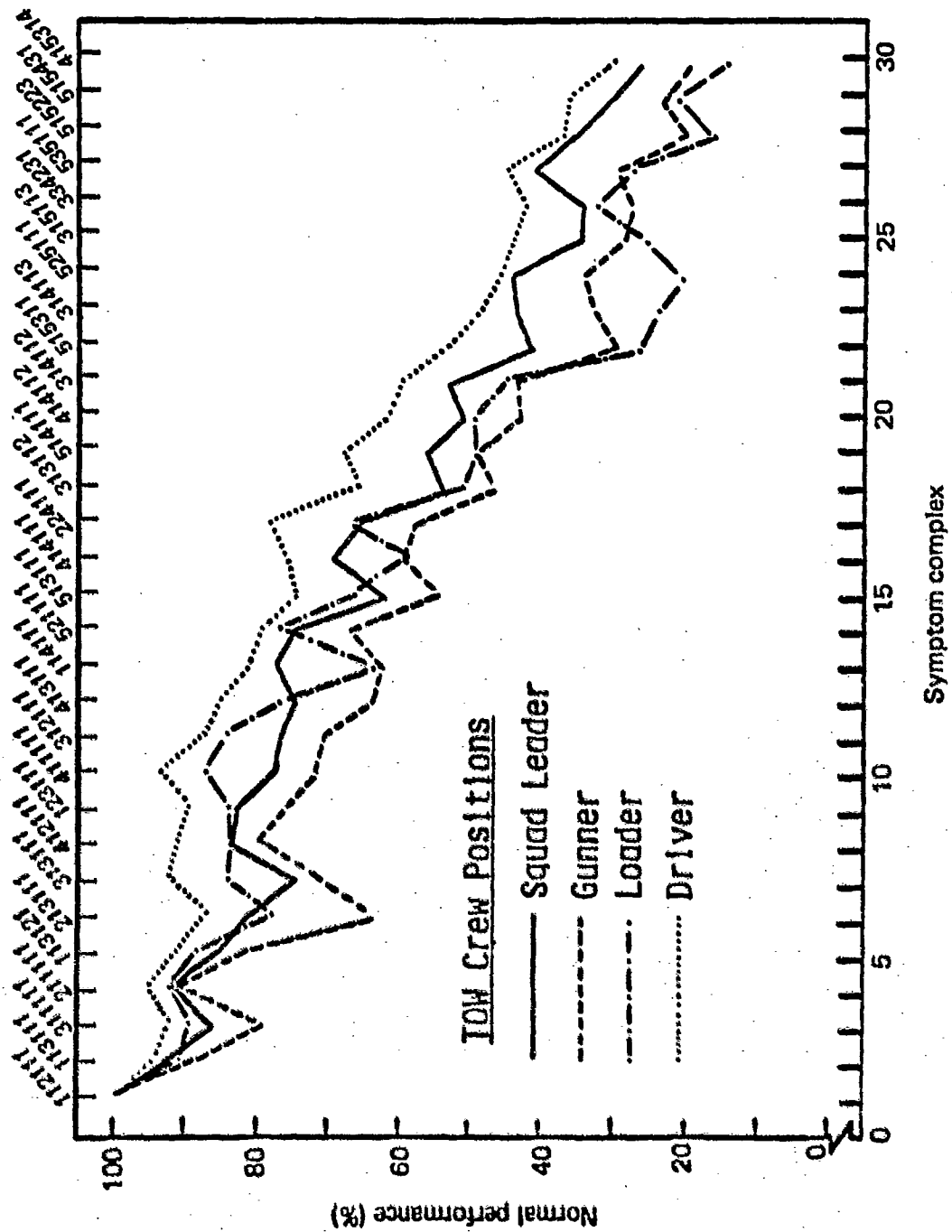


Figure 10. Mean percent of normal performance for mounted TOW crew positions as function of perceived symptom complex severity across all crews.

- Task 1. How long would it take to climb two flights of stairs briskly?
- Task 2. How long would it take to lift five heavy boxes of books from the floor to a 3-ft-high table?
- Task 3. How many flights of stairs could a crewman climb quickly before becoming breathless?
- Task 4. How long could a crewman keep walking at a brisk pace before his legs got tired?
- Task 5. How many heavy boxes could a crewman keep lifting from the floor to a table before he would have to rest?
- Task 6. How long would it take a crewman to open a simple three number combination lock?

Each task was analyzed across all respondents in terms of (1) the percent of respondents who indicated that a given symptom complex would have no effect and an incapacitating effect, and (2) the expected percent of normal performance as a function of the symptom complex. Multiple regression analyses were also used to determine the importance of symptom components in explaining the obtained percentage of normal performance for each task.

Table 28 presents the percent of respondents who indicated that task performance would be unaffected or not possible for each symptom complex. With the exception of task 6, the opening of a simple combination lock, the percent of responses in the no effect category were generally lower than for the military tasks, and the percent of responses in the cannot do category were generally higher than for the military tasks across all symptoms and within particular symptoms. This difference may be attributed to the relative criticality, perceived by respondents, in performing the two sets of tasks. The importance of completing a task in a military operation, especially in combat, was anecdotally reflected as high.

With respect to differences among the ordinary tasks, Fig. 11 shows the percent of respondents who rated each task in the cannot do category. For the 10 mildest symptom complexes, less than 5 percent

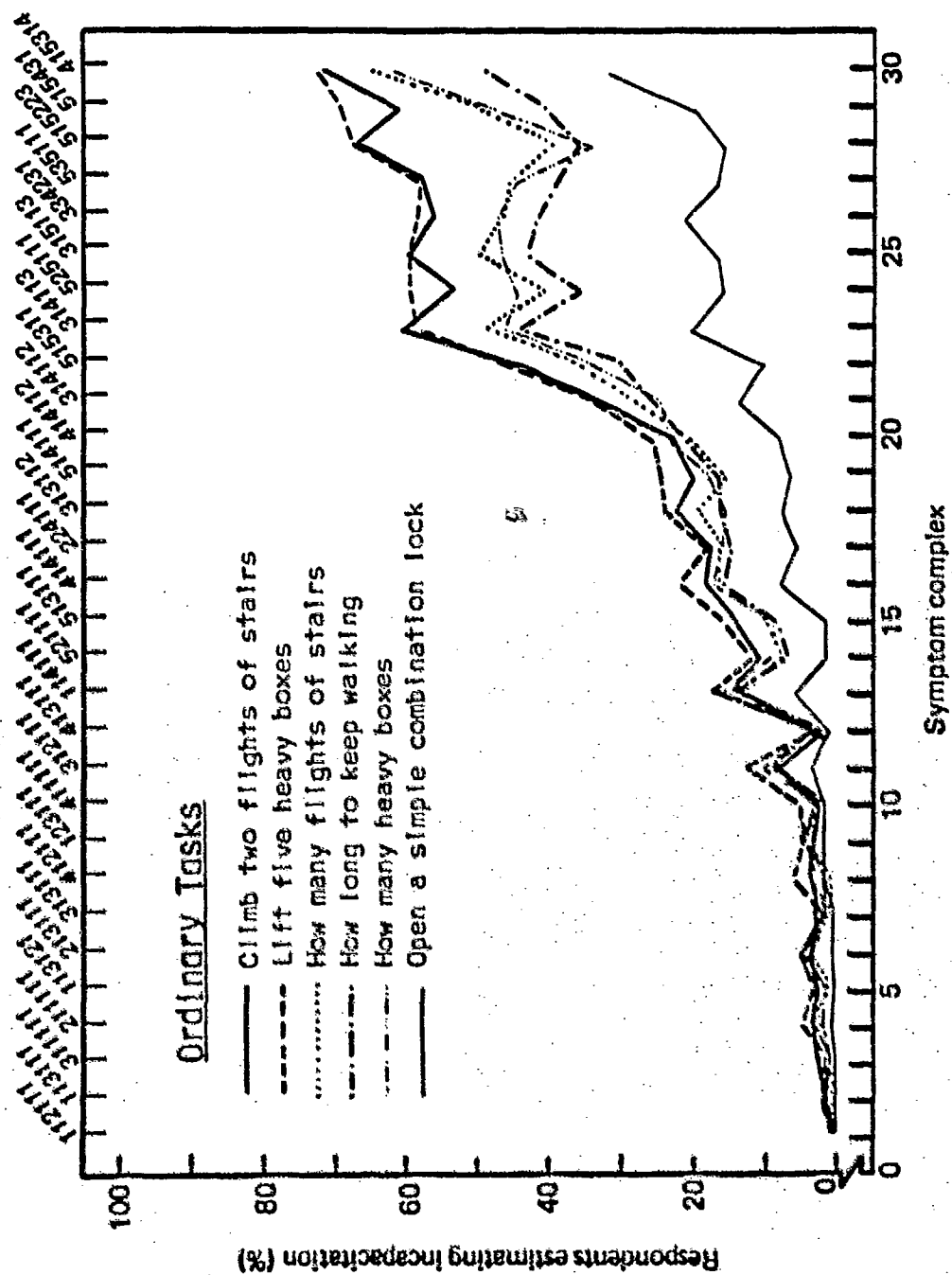


Figure 11. Mean percent of respondents who estimated task performance incapacitation for six ordinary tasks as function of perceived symptom complex severity across all crews.

of the respondents expected incapacitation. However, strong differences emerged between tasks as severity increased. Tasks 1 and 2 were rated as least resistant to incapacitation at higher severity levels (25.17 and 26.70 percent of responses in the cannot do category, respectively); whereas, tasks 3, 4, and 5 (20.22, 18.39, and 20.01 percent, respectively) were perceived as somewhat less affected, and task 6 (8.22 percent) as most resistant. These differences may be attributable to the basic difference in the nature of the tasks. Tasks 1 and 2 presumably require a short, dynamic strength component, whereas tasks 3, 4, and 5 tap endurance. Task 6 was a fine psychomotor task that did not require strength. However, differences were also confounded by the method of collecting data, as explained in Sec. 2.

Table 29 and Fig. 12 present the results of the analyses of the mean percent of normal performance. The rank order of perceived severity across tasks was very consistent [Kendall's $W = 0.98$, $\chi^2(29) = 169.91$, $p < 0.001$]. Across all symptom complexes the averaged expected degradation varied between 35.75 percent of normal performance for task 4 and 56.54 percent for task 6. As compared with results for military tasks, the means for all tasks under milder symptom conditions were depressed (for example, for symptom complex 112111 the overall mean was 78.81 percent). This difference was probably due in large part to the adjustment on military task data performance, since a similar adjustment on ordinary task data increased the overall mean to 56.34 percent, as compared with 63.54 percent for military tasks. Perceived criticality may also have been a factor.

With respect to specific task patterns, Fig. 12 clearly shows that task 6 was believed to be less degraded than the other tasks at moderate and severe symptom levels. The size of the standard deviations shown in Table 29 suggests that differences among other tasks may be more imagined than real.

Multiple regression analyses were conducted on the percent of normal performance for each task across all respondents. The results are summarized in Table 30. Tasks 1 through 5 showed similar patterns based on predictor and criterion relationships. The most important

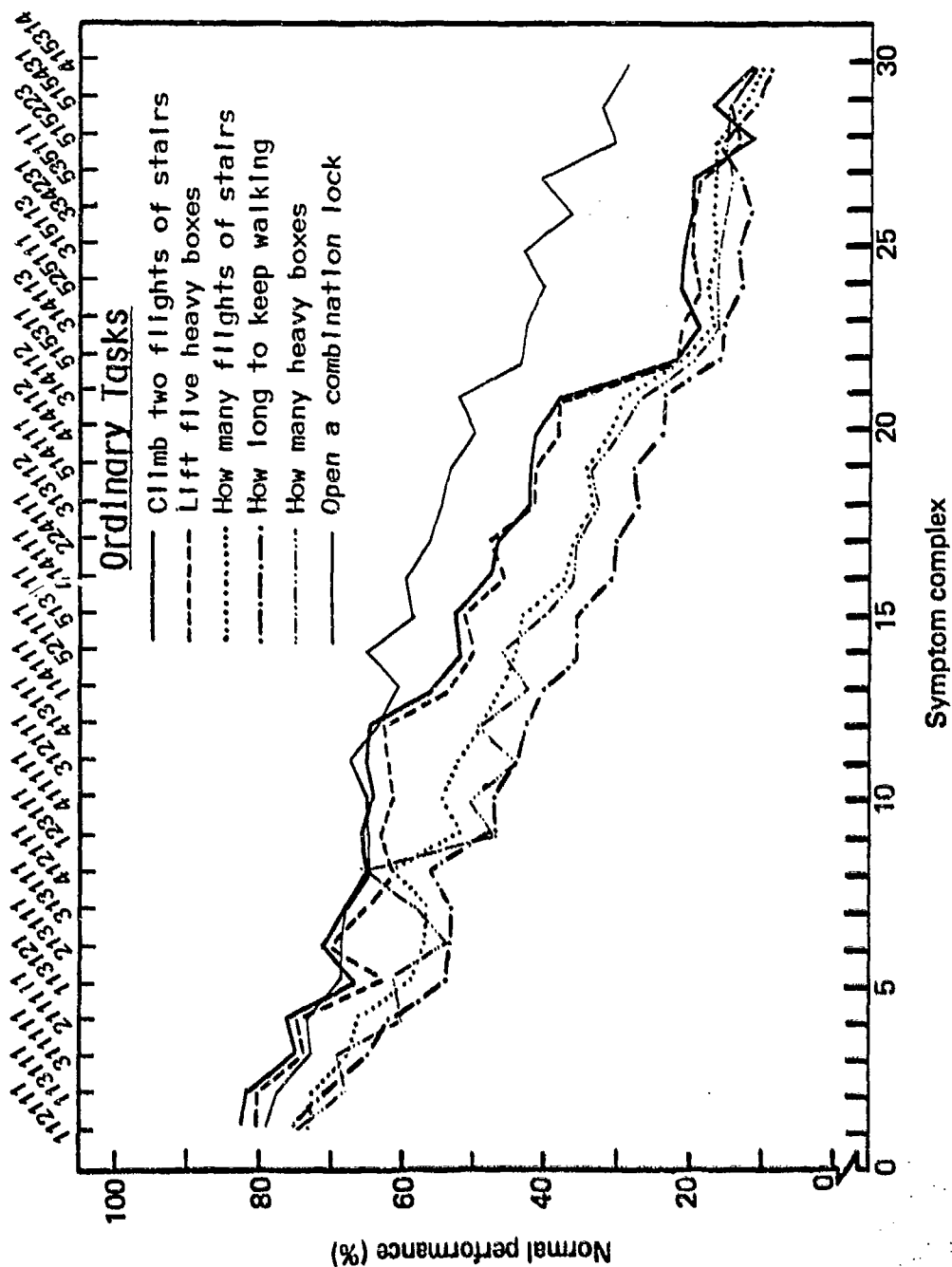


Figure 12. Mean percent of normal performance for six ordinary tasks as function of perceived symptom complex severity across tasks.

symptom component was fatigability/weakness, followed by fluid loss. The upper and lower gastrointestinal distress components were of moderate importance to the regression analysis equations; hypotension and infection and bleeding were less important, if at all, to the predictability. Multiple adjusted R^2 values ranged between 0.31 and 0.37. Task 6 was less amenable to prediction by the regression analysis, with the equation accounting for about 18 percent of the variance; fluid loss and upper gastrointestinal distress together accounted for most of the explained variance, followed by fatigability/weakness, infection and bleeding, lower gastrointestinal distress, and hypotension.

SELF-CONFIDENCE RATING

Two analyses were performed. First, differences in the distributions of confidence ratings were compared across crews, in terms of the frequency of responses in each of five categories. The second analysis compared the distribution of confidence levels between symptom sets, in order to examine whether the severity of symptoms would affect individual confidence ratings. For a detailed discussion of self-confidence ratings, see Appendix E.

SECTION 4

DISCUSSION AND CONCLUSIONS

The results of the questionnaire clearly reflect crewmember expectations of the effects of illness symptoms on combat performance. Across tasks, positions, and crews, a substantial percent of respondents judged that the symptoms listed on the questionnaire would degrade performance. Furthermore, the expected effects of illness on performance were similar across the types of tasks, positions, and crews used as examples on the questionnaires. The following discussion centers on the degree and similarity of responses to expected effects on performance and focuses on some reasons why the particular results were obtained.

Three measures of the effects of illness were examined: (1) the percent of respondents who judged performance to be unaffected, and responded in the no effect category, (2) the percent of respondents who judged performance to be impossible--incapacitation--and responded to the cannot do category, and (3) the average percent of normal performance. All of these measures indicated that respondents expected illness symptoms to cause substantial decrements in military task performance.

A minority of respondents believed that symptom complexes would have no effect on performance. Across positions and symptoms, an average of 20 to 40 percent of respondents believed that any given symptom complex would have no effect. On the other hand, the percent of responses in the no effect category did not exceed 93 percent, even for the mildest symptom complexes. These data indicate that a large percent of respondents expected illness to degrade performance under conditions of the mildest symptoms.

The percent of responses in the cannot do category indicated that total incapacitation was not expected by more than 5 percent of respondents until symptom complexes became moderate to severe. The loader position in the artillery gun crew was the single exception to this response pattern. Comparisons across crews revealed that respondents perceived positions in the FDC to be less incapacitated in 21 to

30 symptom complexes, the exception being symptom complex 415314, in which the percent of responses in the cannot do category did not exceed 20 percent. In contrast, those responding to the artillery gun, tank, and TOW crew questionnaires reported only minimal expectations of crewman incapacitation for mild symptoms; whereas, 30 percent or more indicated incapacitation for most positions with moderate and severe symptom complexes. In some positions within these groups, more than 70 percent of respondents predicted incapacitation. These variations may reflect basic differences in work requirements.

The results of the measure of the percent of normal performance also suggest that respondents expected substantial performance degradation, even for mild symptoms. The obtained decrement factors were adjusted by the responses to symptom complex 112111, which reduced the average of expected impact; but a steep decline in performance as a function of symptom severity was found for all positions. These data also indicate that FDC positions were perceived by respondents to have a lesser performance degradation than positions of the other three crews. Specific positions within crews appeared to differ with respect to the particular levels of degradation. The differences between specific positions within crews may be more imagined than real; and variations in respondent performance degradation estimates were large enough in most instances to make the differences insignificant. The measure of the percent of normal performance depended on the normal or referent time for each task. To the degree that the respondents were not satisfied with the referent time given, the computed decrement would not always reflect a fair estimate of the expected decrement.

The responses across symptoms within each position or crew displayed a consistent and systematic pattern of illness severity. Again, the variability between responses for particular symptom complexes suggests that differences between levels of severity of less than 20 percent may be insignificant. The consistency in response patterns indicates that respondents believed the illnesses described would degrade crewmember performance substantially.

Analysis of ordinary task performance data also supports the conclusions made here. The degree of performance degradation expected by

respondents for an ordinary task was greater than the degree reported for military tasks. The differences were due in part to the adjustment in decrement factors by responses to control symptom complex 112111 for military tasks, as well as to differences in perceived importance of ordinary versus military tasks. However, it should be stressed that any precise values obtained in this study are not as important as the consistency of decrements in performance observed across sets of symptoms--consistency among ordinary tasks, and between ordinary and military tasks.

The results of multiple regression analyses suggest that quantitative prediction of performance degradation is possible, although imprecise. The analyses indicate that a sizable percent of the expected decrement could be predicted or explained if scale values of the six symptom components used to construct symptom complex descriptions were known. In the tank, TOW, and artillery gun crew positions, the most important predictors causing changes in percent of normal performance across symptom complexes were fatigability/weakness and fluid loss. Upper gastrointestinal distress was a moderately important predictor of performance. For FDC positions, fluid loss and lower gastrointestinal distress were perceived as the most important predictors of performance degradation, with fatigability/weakness a lesser factor than in other crews.

The linear combination of symptom components accounted for 27 to 43 percent of the variation of judgment across symptoms for specific crew positions. For combined crew performance, 43 percent of the variation was predicted. Standard error of prediction for specific positions ranged between 22.40 and 33.62 percent. For combined crew analysis, the standard error was 23.89 percent. Although exactness is desired, the results obtained in this study are more than adequate for quantitative modeling of radiation exposure effects on task performance, provided that performance falls within a range and is not treated as a point estimate. The number of respondents available was limited by operational constraints. Only a small subset of the possible 15,625 symptom complexes was selected for study. Those selected

were directly linked with specific doses of radiation and times after exposure. Although impractical for the data collection process used in this study, a representative sampling of the symptom complex domain with larger sample sizes would increase predictability and precision of the expected effects of radiation on performance.

It is recommended that continued research into the illness-performance relationship should incorporate more intensive methods for collecting information, in addition to the group administered questionnaire. One avenue of future research could be to use a Delphi approach [Dalkey, 1972], which includes several iterations of judgments for examining, assessing, and refining the results of present research in the context of more involvement, knowledge storing, and discussion.

Although the present study provides a good beginning to understanding radiation effects on task performance, it should be recognized that the results are unrefined estimates made by military personnel who had relatively little time or experience in making complex judgments. Also, the revisit questionnaires, while providing additional information that was useful in interpreting and supplementing the original questionnaire results, were limited by time and logistical constraints, and thus did not provide an opportunity for exercising a Delphi approach to achieve a solid consensus among respondents. Future research that addresses these concerns would contribute greatly to the understanding of the effect of a nuclear engagement on combat performance effectiveness.

Finally, it must be remembered that at this time, psychological factors that might affect task performance during a tactical nuclear detonation were intentionally not addressed. However, the psychological dimension frequently surfaces as an important issue that could have bearing on the interpretation of combat performance that is expressed here. Therefore, we believe that research to specifically address the psychological factors that may affect combat performance on a nuclear battlefield deserves timely attention.

Table 1. Length of time in army and specialty area for respondents in four crews.

Crew	Number of Respondents	Time in Army (year)			Time in Specialty Area (year)		
		Mean	S.D.	Range	Mean	S.D.	Range
Artillery gun	21	7.55	5.05	15.50	5.75	4.02	14.33
FDC	23	5.16	3.89	14.00	4.54	3.60	14.00
Tank	40	10.08	1.92	8.00	9.25	2.00	9.42
TOW	41	11.27	2.20	10.67	7.00	2.67	14.00
Total, all crews	125	9.14	3.81	14.61	7.05	3.39	16.42

NOTE: S.D. = standard deviation.

Table 2. Military pay grade for respondents in four crews.

Crew	Number of Respondents	Military Pay Grade (for percent of respondents)			
		E-4	E-5	E-6	E-7
Artillery gun	21	0	61.9	23.8	14.3
FDC	23	43.5	31.8	18.2	4.5
Tank	40	0	0	82.1	17.9
TOW	41	0	0	87.2	12.8
Total, all crews	125	8.0 ^a	16.3 ^a	62.2 ^a	13.2 ^a

^aMean percent for all crews.

Table 3. Length of time in positions for respondents in four crews.

Crew Position	Number of Respondents	Time in Position (year)			
		Mean	S.D.	Range	
Artillery gun					
Chief of section	21	2.43	2.54	8.83	
Gunner	17	0.87	0.89	4.00	
Assistant gunner	15	0.58	0.68	2.50	
Loader	12	0.46	0.51	1.50	
FDC					
HCO	18	0.97	0.89	3.00	
Computer	20	1.95	2.24	10.00	
Tank					
Tank commander	40	5.30	2.40	11.00	
Gunner	33	1.28	0.96	4.00	
Loader	22	0.58	0.66	2.00	
Driver	22	0.81	1.03	5.00	
TOW					
Squad leader	39	3.33	1.95	7.00	
Gunner	23	0.49	0.72	3.00	
Loader	12	0.27	0.62	3.00	
Driver	10	0.25	0.56	3.00	

NOTE: S.D. = standard deviation.

Table 4. Combat experience for respondents in four crews.

Crew	Number of Respondents	Respondents in Army (%)	Respondents in Specialty Area (%)
Artillery gun	21	19.0	9.5
FDC	23	13.0	0
Tank	40	17.5	2.5
TOW	41	39.0	7.3
Total, all crews	125	22.1 ^a	5.0 ^a

^a Mean percent for all crews.

Table 5. Supervisory experience for respondents in four crews.

Crew	Number of Respondents	Percent of Respondents Who Supervised Given Number of Personnel					
		Number					
		0	2	5	10	20	50 or More
		Percent					
Artillery gun	21	5.0	5.0	35.0	30.0	15.0	10.0
FDC	23	0	10.5	47.4	31.6	0	10.5
Tank	40	0	0	0	2.5	22.5	75.0
TOW	41	0	0	0	7.5	17.5	75.0
Total, all crews	125	0.8 ^a	2.5 ^a	13.4 ^a	13.4 ^a	16.0 ^a	53.8 ^a

^aMean percent for all crews.

Table 6. Normal referent times for task completion as stated on questionnaires.

Crew Position	Task	Normal Referent Time (sec)
Artillery gun		
Chief of section	Receive fire order and call quadrant elevation, deflection, projectile, charge, fuze	3
Gunner	Set deflection	7
	Traverse tube and level bubble	7
Assistant gunner	Set quadrant elevation	7
	Elevate tube and level bubble	3
Loader	Lift projectile to tray	2
	Position and operate hydraulic rammer	5
	Place charge and release breech block	2
	Insert primer and close firing lock	1.5
	Attach lanyard and fire	1.5
	Swab tube and inspect bore	3
FDC		
FDO	Announce fire order	2
	Review calculations	5
	Announce fire mission	3
HCO	Plot target location on chart	1 (5) ^a
	Orient deflection protractor	1 (3) ^a
	Read range, deflection by protractor	3
Computer	Calculate fuze settings, deflection, and quadrant elevation	15
	Announce fire commands to guns	3
Tank		
Tank commander	Issue fire command	1
	Range the target	5
	Depress and lay gun for direction	3
	Issue subsequent fire command	4
Gunner	Identify target	1
	Aim and fire	6
	Apply fire adjustment and fire	7
Loader	Arm	1
	Load and arm	5
Driver	Stop	4
Mounted TOW		
Squad loader	Designate azimuth and target	4
	Command driver to firing position	2
Gunner	Set superelevation, erect, slew 170 to 10 deg azimuth	17
	Adjust magnification, acquire targets, identify, arm and fire	7
Loader	Reload	60
	Rearrange ready rack	60
Driver	From standstill, drive forward 40 ft and stop	20

^a Computations for response analysis in report reflect error in referent times; correct values are given in parentheses.

Table 7. Intertask consistency averaged across symptoms for positions within four crews.

Crew Position	Number of Tasks	Average Correlation ^a	
		Raw	Adjusted
Artillery gun			
Chief of section	1	--	--
Gunner	2	0.88	0.95
Assistant gunner	2	0.73	0.87
Loader	6	0.91	0.89
Crew average		0.84	0.90
FDC			
FDO	3	0.84	0.90
HCO	3	0.85	0.90
Computer	2	0.56	0.75
Crew average		0.76	0.86
Tank			
Commander	4	0.91	0.93
Gunner	3	0.88	0.92
Loader	2	0.53	0.74
Driver	1	--	--
Crew average		0.77	0.86
TOW			
Squad leader	2	0.79	0.90
Gunner	2	0.68	0.84
Loader	2	0.88	0.95
Driver	1	--	--
Crew average		0.78	0.90

NOTE: Adjusted internal consistency estimates based on five tasks. Dashes (--) indicate single task only.

^aAll coefficients significant at $p < 0.001$.

Table 8. Mean percent of normal performance for artillery gun crew positions.

Symptom Complex ^a	Position							
	Chief of Section		Gunner		Assistant Gunner		Loader	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	87.80	20.59	95.33	10.18	95.18	10.51	85.31	24.74
113121	68.81	32.36	85.08	24.45	80.35	25.91	78.61	27.43
114111	75.53	31.41	85.25	17.67	81.29	20.74	64.62	28.31
123111	77.75	30.60	85.55	25.43	83.81	26.30	64.07	40.08
211111	68.97	32.20	90.29	23.51	88.26	24.67	87.29	25.91
213111	72.74	26.84	93.92	8.98	87.32	13.99	77.36	23.55
224111	48.25	35.02	63.57	37.65	58.62	35.82	49.13	42.06
311111	85.35	22.19	93.69	22.24	97.43	7.41	87.14	22.86
312111	74.21	24.54	86.43	17.62	80.18	22.63	75.10	27.21
313111	72.82	29.45	85.60	23.13	81.64	24.08	71.12	33.43
313112	55.41	35.52	67.32	30.91	67.81	26.56	54.56	33.81
314112	42.98	32.82	57.18	35.50	53.25	35.82	43.91	44.06
314113	30.97	33.69	42.26	41.14	40.41	39.26	29.60	41.01
315113	31.97	29.29	50.37	37.99	46.32	34.81	29.09	36.73
334231	18.99	26.89	34.46	36.60	35.31	34.69	23.63	36.55
411111	67.27	32.97	88.91	15.40	80.51	18.94	71.76	28.84
412111	72.93	33.23	84.82	27.22	81.44	30.05	71.15	34.88
413111	68.21	28.04	83.81	22.95	81.61	17.93	73.39	28.03
414111	54.14	34.61	66.55	30.59	61.29	31.02	49.20	40.03
414112	39.40	29.87	59.52	32.62	59.42	28.88	41.97	36.58
415314	17.94	27.37	24.60	32.77	22.50	29.94	12.04	24.17
513111	61.22	32.58	76.19	28.09	73.07	29.04	62.60	38.61
514111	58.02	30.53	73.96	26.22	69.34	27.04	49.94	34.45
515223	33.28	32.95	48.61	30.34	45.19	25.78	13.73	28.13
515311	46.34	31.50	64.56	27.68	76.80	25.66	37.68	37.94
515431	20.30	24.56	40.82	31.54	38.67	31.97	20.43	31.92
521111	63.84	33.65	77.32	26.72	72.90	28.54	66.37	37.89
525111	34.07	33.88	44.67	41.29	43.18	37.00	28.67	38.53
535111	27.87	28.85	46.63	34.24	45.80	30.57	26.25	31.22
Average	55.91		69.91		67.26		54.86	

NOTE: S.D. = standard deviation.

^aIn order of severity, beginning with control symptom complex (normal).

Table 9. Mean percent of normal performance for FDC positions.

Symptom Complex ^a	Position					
	FDO		HCO		Computer	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111	100.00	0.00	100.00	0.00	100.00	0.00
113111	92.89	13.80	95.75	6.53	91.72	12.59
113121	74.10	28.09	77.94	25.60	82.08	20.52
114111	81.21	20.89	80.16	20.77	81.58	16.61
123111	82.31	26.21	76.83	30.87	72.79	28.20
211111	76.67	24.43	80.39	24.14	75.98	21.66
213111	83.58	20.61	81.91	18.17	84.85	14.60
224111	56.14	24.36	58.78	29.19	58.72	28.39
311111	80.76	21.47	81.19	19.25	82.83	16.40
312111	66.92	21.51	75.73	23.71	74.42	15.04
313111	75.93	23.10	68.83	21.34	75.66	21.85
313112	59.69	21.93	69.61	22.73	70.03	19.80
314112	53.25	23.65	60.11	28.06	61.65	24.17
314113	40.49	28.35	47.72	28.43	51.29	23.45
315113	49.70	26.32	52.56	30.75	55.35	28.36
334231	34.34	25.07	44.51	29.67	45.16	28.08
411111	78.65	20.23	81.82	16.14	82.39	18.40
412111	75.81	23.60	75.86	20.66	77.69	19.55
413111	82.76	19.59	75.90	21.19	85.17	16.10
414111	72.61	26.06	69.60	23.45	69.44	23.25
414112	62.38	25.28	66.01	22.64	68.16	17.96
415314	24.42	23.04	31.73	32.66	27.72	27.93
513111	69.30	21.56	70.48	21.77	71.91	19.35
514111	59.86	21.36	59.19	25.29	60.59	23.69
515223	46.11	25.24	45.16	29.44	47.10	26.82
515311	58.90	21.55	59.38	22.72	65.30	20.54
515431	40.62	21.54	44.75	29.02	46.97	24.11
521111	69.00	26.07	68.20	27.89	68.30	25.42
525111	47.66	22.10	55.86	25.38	54.69	23.69
535111	43.11	21.79	49.70	27.15	53.07	22.98
Average	64.64		66.86		68.09	

NOTE: S.D. = standard deviation.

^aIn order of severity, beginning with control symptom complex (normal).

Table 10. Mean percent of normal performance for tank crew positions.

Symptom Complex ^a	Position							
	Tank		Gunner		Loader		Driver	
	Commander							
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	97.64	6.96	96.95	9.80	96.63	7.69	97.26	9.82
113121	90.19	15.41	91.72	13.50	87.10	17.57	89.09	15.94
114111	75.27	22.94	81.47	18.58	74.34	23.88	78.13	23.87
123111	82.77	25.42	84.39	24.07	79.27	24.63	76.72	30.72
211111	92.39	15.60	92.75	16.08	93.89	13.25	95.04	12.65
213111	79.39	22.79	82.07	17.91	81.20	22.37	87.78	19.73
224111	61.34	32.04	66.33	32.45	63.72	30.42	66.85	30.52
311111	86.07	18.65	84.59	17.50	88.65	16.03	96.27	8.57
312111	79.73	22.64	81.68	20.94	83.23	20.88	83.63	22.14
313111	82.59	19.85	84.41	17.11	84.72	17.14	86.15	18.46
313112	52.10	28.73	57.83	30.87	53.32	32.19	59.64	34.77
314112	44.75	33.59	50.35	35.09	47.39	34.91	51.20	36.57
314113	32.74	29.54	39.65	33.02	30.53	29.19	41.66	36.44
315113	35.59	31.33	41.92	34.99	27.96	23.61	33.05	31.99
334231	31.12	31.82	38.34	35.58	35.35	35.89	38.91	36.57
411111	73.25	20.82	76.31	20.44	79.95	20.89	85.66	19.90
412111	81.67	22.60	82.98	21.20	81.86	20.94	85.43	22.36
413111	75.86	20.53	79.73	19.40	80.05	21.38	83.54	20.64
414111	67.81	27.03	71.44	26.21	63.85	27.43	70.76	26.96
414112	53.07	26.16	57.77	24.13	55.03	26.80	61.87	28.20
415314	16.59	23.20	17.67	26.42	16.37	24.58	23.61	32.94
513111	63.80	30.15	69.72	29.12	70.08	28.61	73.85	30.88
514111	52.01	24.46	62.59	25.72	56.01	26.02	68.85	28.55
515223	31.83	27.00	36.92	30.45	28.26	27.01	35.38	30.46
515311	37.30	28.25	45.11	31.48	40.39	31.89	42.35	29.82
515431	26.15	22.99	33.46	27.45	28.57	28.19	36.57	31.82
521111	58.12	35.13	61.54	34.37	60.08	36.41	66.89	36.18
525111	26.04	29.98	31.25	34.09	29.13	33.16	32.25	36.08
535111	29.92	26.21	33.87	29.19	26.78	26.60	33.82	32.27
Average	60.57		64.49		61.46		66.07	

NOTE: S.D. = standard deviation.

^aIn order of severity, beginning with control symptom complex (normal).

Table 11. Mean percent of normal performance for mounted TOW crew positions.

Symptom Complex ^a	Position							
	Squad Leader		Gunner		Driver		Loader	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	92.36	19.89	88.46	23.13	95.33	16.84	91.18	23.49
113121	85.03	24.75	81.74	28.10	91.46	19.81	88.53	24.35
114111	77.11	23.45	61.99	26.04	81.05	23.51	63.16	29.87
123111	82.61	26.93	75.21	30.24	89.87	19.82	83.84	24.07
211111	91.34	21.56	90.95	20.70	95.12	17.54	92.21	18.56
213111	80.36	26.98	62.86	29.53	87.12	21.06	77.68	24.73
224111	65.23	25.41	57.30	29.25	78.37	23.87	67.28	28.22
311111	86.19	20.01	79.80	23.66	92.85	12.30	89.28	19.16
312111	76.63	22.26	70.09	30.17	87.22	17.37	84.48	15.07
313111	74.50	24.27	70.39	25.07	92.83	10.99	83.79	23.30
313112	53.20	27.24	45.97	29.04	64.88	30.18	50.76	33.86
314112	52.84	30.21	42.78	31.57	59.10	34.33	44.26	36.60
314113	42.86	31.36	31.85	31.14	48.01	35.50	22.95	34.33
315113	33.69	28.99	27.78	28.19	43.77	35.05	24.71	31.84
334231	33.12	28.74	26.29	25.86	41.53	35.16	31.20	33.02
411111	77.50	22.72	71.82	28.80	93.76	12.42	87.19	13.53
412111	83.42	23.70	79.16	25.57	91.62	13.79	83.94	21.08
413111	74.33	26.07	63.06	26.28	85.37	20.65	76.77	29.92
414111	68.98	28.84	59.28	29.08	75.27	25.92	58.24	30.78
414112	50.88	28.17	42.17	28.82	61.76	35.30	48.76	37.22
415314	25.22	28.38	18.27	26.23	29.83	32.94	13.82	25.08
513111	61.84	28.19	53.81	32.10	74.15	26.93	66.35	32.00
514111	55.71	31.03	48.55	30.03	67.61	35.57	48.68	37.69
515223	34.59	27.42	18.90	20.49	36.05	32.24	15.52	26.38
515311	40.48	30.78	28.98	24.64	52.84	30.38	25.05	31.11
515431	29.35	23.12	22.26	22.78	35.64	31.89	20.17	27.21
521111	74.64	29.26	66.80	33.01	79.65	26.90	76.80	32.34
525111	43.63	32.85	33.15	31.98	46.38	37.83	19.94	33.03
535111	40.06	28.87	28.48	27.37	44.54	36.25	26.89	34.22
Average	62.92		54.94		70.77		58.78	

NOTE: S.D. = standard deviation.

^aIn order of severity, beginning with control symptom complex (normal).

Table 12. Order of symptom complex severity across positions for four crews.

Symptom Complex Severity Ratings by Crew ^a				
Artillery Gun	FDC	Tank	TOW	All Crews
112111	112111	112111	112111	112111
311111	113111	113111	113111	113111
113111	213111	211111	211111	311111
211111	311111	311111	311111	211111
123111	413111	113121	113121	113121
313111	411111	313111	411111	213111
412111	114111	412111	412111	313111
213111	211111	213111	123111	412111
113121	113121	312111	312111	123111
312111	123111	123111	313111	411111
411111	412111	413111	213111	312111
413111	313111	411111	521111	413111
114111	312111	114111	413111	114111
513111	513111	414111	114111	521111
521111	414111	513111	224111	513111
525111	313112	224111	414111	414111
224111	521111	521111	513111	224111
313112	414112	514111	514111	313112
314113	515311	414112	313112	514111
514111	514111	313112	414112	414112
414111	314112	314112	314112	314112
314112	224111	515311	515311	515311
515311	315113	314113	314113	314113
414112	525111	334231	525111	525111
315113	535111	315113	535111	315113
334231	515223	515223	315113	334231
415314	314113	515431	334231	535111
515223	515431	535111	515223	515223
535111	334231	525111	515431	515431
515431	415314	415314	415314	415314

NOTE: Order of symptom sets was determined by the sum of ranks for the percent of normal performance across crewmembers. Rank order agreement tested across crews; Kendall's $W = 0.95$, $\chi^2(29) = 109.74$, $p < 0.001$.

^aIn order of severity, beginning with control symptom complex (normal).

Table 13. Rank order consistency of symptoms across four crews.

Crew Position	Tasks within Position ^a	
	Kendall's W	χ^2
Artillery gun		
Chief of section	--	--
Gunner	0.98	57.10
Assistant gunner	0.97	56.41
Loader	0.96	167.87
FDC		
FDO	0.98	85.08
HCO	0.97	84.80
Computer	0.98	56.78
Tank		
Commander	0.98	115.16
Gunner	0.98	85.31
Loader	0.99	57.21
Driver	--	--
TOW		
Squad leader	1.00	77.65
Gunner	0.99	77.33
Loader	1.00	77.85
Driver	--	--
Crew	All Positions within Crew ^a	
	Kendall's W	χ^2
Artillery gun	0.94	109.15
FDC	0.97	84.76
Tank	0.98	114.05
TOW	0.98	113.52
Rank order consistency across crews	0.94	109.10

NOTE: Based on average percent of normal performance computed across subjects on 30 symptom complexes, with responses in no effect and cannot do categories included. Dashes (--) indicate single task only.

^aAll values of χ^2 are significant at $p < 0.001$, $df = 29$.

Table 14. Summary of average expected effects across 30 symptom complexes on artillery gun crew tasks.

Position	Task	Responses in Unaffected Category (%)	Responses in Incapacitated Category (%)	Mean Percent of Normal Performance
Chief of section	Receive fire order and call	31.75	13.49	55.91
Gunner	Set deflection	44.76	13.38	72.07
	Traverse tube and level bubble	36.51	13.81	68.19
Assistant gunner	Set quadrant elevation	46.51	11.43	74.40
	Elevate tube and level bubble	35.87	12.54	60.71
Loader	Lift projectile to tray	30.48	29.37	48.99
	Position and operate rammer	43.49	18.25	64.05
	Place charge, release breech block	32.86	23.02	56.20
	Insert primer, close firing lock	35.40	11.90	62.33
	Attach lanyard and fire	44.29	11.27	67.98
	Swab tube and inspect bore	47.14	12.54	70.34

Table 15. Summary of average expected effects across 30 symptom complexes on FDC crew tasks.

Position	Task	Responses in Unaffected Category (%)	Responses in Incapacitated Category (%)	Mean Percent of Normal Performance
FDO	Announce fire order	29.27	4.33	57.50
	Review calculations	34.02	5.65	67.09
	Announce fire mission	41.57	4.19	69.32
HCO	Plot target location on chart	31.62	5.93	69.22
	Orient deflection protractor	40.92	5.21	69.78
	Read range, deflection by protractor	27.04	5.64	61.99
Computer	Calculate fuze setting, deflection, quadrant elevation	32.03	4.92	75.63
	Announce fire commands to gunner	27.10	4.05	60.92

Table 16. Summary of average effects across 30 symptom complexes on tank crew tasks.

Position	Task	Responses in Unaffected Category (%)	Responses in Incapacitated Category (%)	Mean Percent of Normal Performance
Tank commander	Issue fire command	34.38	13.92	53.10
	Range the target	38.97	15.25	65.03
	Press and lay gun for direction	34.71	15.42	59.37
	Issue subsequent fire command	36.63	14.03	64.70
Gunner	Identify target	36.29	14.08	55.93
	Aim and fire	42.22	14.00	69.95
	Apply fire adjustment and fire	35.46	14.33	68.06
Loader	Arm	49.73	14.67	63.81
	Load and arm	28.95	19.81	59.05
Driver	Stop	39.55	15.67	66.07

Table 17. Summary of average expected effects across 30 symptom complexes for mounted TOW tasks.

Position	Task	Responses in Unaffected Category (%)	Responses in Incapacitated Category (%)	Mean Percent of Normal Performance
Squad leader	Designate azimuth and target	36.69	8.49	63.41
	Command driver to firing position	40.35	7.51	62.44
Gunner	Set super-elevation, erect, and slew 70 deg	31.47	12.20	47.89
	Adjust magnification, acquire target, arm and fire	30.17	12.60	62.96
	Track target last 6 sec	25.08	11.94	66.06
Loader	Reload	27.20	27.90	58.00
	Rearrange ready rack	27.66	25.84	59.61
Driver	Drive forward 40 ft and stop	39.54	12.92	70.77

Table 18. Mean percent of normal performance
for combined crew.

Symptom Complex ^a	Crew							
	Artillery Gun		FDC		Tank		TOW	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	90.90	13.52	93.45	9.03	97.12	5.72	91.83	18.18
113121	78.22	25.70	78.04	22.65	89.53	12.91	86.69	21.57
114111	76.67	18.92	80.98	16.62	77.30	18.26	70.83	19.37
123111	77.79	27.31	77.31	26.09	80.79	22.82	82.88	22.05
211111	83.70	23.69	77.68	21.91	93.52	12.86	92.40	18.03
213111	82.84	13.53	83.45	15.56	82.61	17.34	77.01	19.88
224111	54.89	34.00	57.88	24.49	64.56	29.03	67.04	20.85
311111	90.90	13.01	81.60	14.82	88.89	11.99	87.03	15.35
312111	78.98	20.38	72.36	16.32	82.07	18.69	79.60	17.36
313111	77.80	23.48	73.48	18.93	84.47	14.51	80.38	15.55
313112	61.27	27.52	66.44	18.94	55.72	29.09	53.70	24.52
314112	49.33	34.53	58.34	23.86	48.42	33.66	49.42	28.42
314113	35.81	36.28	46.50	24.82	36.14	30.05	36.42	28.01
315113	39.44	30.90	52.54	26.94	34.63	27.20	31.85	26.89
334231	28.10	29.84	41.34	24.94	35.93	32.86	33.04	27.88
411111	77.11	19.16	80.95	15.13	78.79	16.88	82.57	15.16
412111	77.59	28.79	76.46	18.82	82.98	18.35	84.54	17.75
413111	76.76	22.06	81.28	16.07	79.80	15.59	74.88	19.17
414111	57.79	31.15	70.55	21.00	68.47	23.91	65.44	22.91
414112	50.07	25.72	65.52	19.49	56.94	23.41	50.89	26.83
415314	19.27	26.57	27.96	26.93	18.56	25.13	21.78	23.44
513111	68.27	28.26	70.56	18.18	69.36	27.27	64.04	26.78
514111	62.81	25.08	59.88	20.79	59.86	23.34	55.14	28.46
515223	35.20	23.30	46.12	24.63	33.10	26.71	26.27	20.92
515311	53.59	24.67	61.19	19.09	41.29	28.10	36.84	25.39
515431	30.06	24.62	40.11	22.74	31.19	24.75	26.86	21.82
521111	70.11	27.33	68.50	24.56	61.66	33.50	74.47	26.66
525111	37.65	34.51	52.74	21.33	29.67	31.94	35.78	27.91
535111	36.64	27.25	48.63	22.20	31.10	26.71	34.99	26.19
Average	61.99		66.53		63.15		61.82	

NOTE: S.D. = standard deviation.

^aIn order of severity, beginning with control symptom complex (normal).

Table 19. Summary of multiple regression analysis of symptoms on combined crew performance.

Symptom Component	R^2	β	F
Fatigability/ weakness	0.3183	-0.242	191.387 ^a
Fluid loss	0.3531	-0.299	406.114 ^a
Upper gastrointestinal distress	0.3900	-0.205	212.375 ^a
Infection and bleeding	0.4108	-0.086	25.985 ^a
Lower gastrointestinal distress	0.4263	-0.167	122.639 ^a
Hypotension	0.4290	-0.081	18.471 ^a
Intercept constant	0.0001	-0.024	4.162 ^b

NOTE: Adjusted $R^2 = 0.428$, standard error = 23.885.
All values of β tested with F statistic; $df = 1$, and 355.

^a $p < 0.001$.

^b $p < 0.05$.

Table 20. Mean percent of responses in no effect and cannot do categories for artillery gun crew positions.

Symptom Complex ^a	Position							
	Chief of Section		Gunner		Assistant Gunner		Loader	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	71.43	0.00	76.19	0.00	76.19	0.00	52.38	4.76
113121	42.86	4.76	52.38	4.76	47.62	4.76	23.81	4.76
114111	57.14	0.00	42.86	0.00	38.09	0.00	4.76	9.52
123111	57.14	4.76	52.38	4.76	52.38	4.76	19.05	23.81
211111	42.86	4.76	71.43	4.76	71.43	4.76	61.91	4.76
213111	42.86	0.00	61.91	0.00	47.62	0.00	14.29	4.76
224111	19.05	14.29	28.57	19.05	23.81	19.05	9.52	38.09
311111	66.67	0.00	85.71	4.76	85.71	0.00	38.09	4.76
312111	42.86	0.00	47.62	0.00	47.62	0.00	28.57	4.76
313111	42.86	4.76	47.62	4.76	42.86	4.76	23.81	19.05
313112	28.57	9.52	23.81	9.52	19.05	4.76	4.76	19.05
314112	9.52	14.29	14.29	19.05	19.05	19.05	19.05	42.86
314113	9.52	38.09	14.29	42.86	9.52	42.86	9.52	61.91
315113	9.52	23.81	14.29	28.57	4.76	28.57	0.00	57.14
334231	4.76	52.38	4.76	47.62	4.76	42.86	0.00	66.67
411111	42.86	0.00	52.38	0.00	38.09	0.00	14.29	9.52
412111	52.38	4.76	52.38	4.76	57.14	4.76	23.81	14.29
413111	33.33	4.76	38.09	4.76	33.33	0.00	9.52	4.76
414111	23.81	9.52	19.05	9.52	14.29	9.52	9.52	33.33
414112	9.52	19.05	9.52	14.29	4.76	9.52	0.00	38.09
415314	4.76	61.91	0.00	61.91	0.00	61.91	0.00	76.19
513111	28.57	4.76	33.33	4.76	33.33	4.76	19.05	23.81
514111	23.81	4.76	23.81	4.76	23.81	4.76	4.76	23.81
515223	9.52	23.81	9.52	19.05	4.76	14.29	0.00	76.19
515311	14.29	9.52	9.52	9.52	9.52	4.76	4.76	42.86
515431	4.76	23.81	4.76	23.81	9.52	23.81	4.76	61.91
521111	38.09	4.76	42.86	4.76	42.86	4.76	19.05	19.05
525111	9.52	38.09	14.29	42.86	4.76	38.09	0.00	61.91
535111	9.52	38.09	14.29	42.86	4.76	38.09	0.00	52.38
average	31.75	13.49	35.40	13.97	32.54	12.54	17.30	30.00

^aIn order of severity, beginning with control symptom complex (normal).

Table 21. Summary of multiple regression analysis for artillery gun crew positions.

Symptom Component	β Weights for Position			
	Chief of Section	Gunner	Assistant Gunner	Loader
Upper gastrointestinal distress	-0.150 ^a	-0.116 ^b	-0.125 ^a	-0.131 ^a
Lower gastrointestinal distress	-0.165 ^a	-0.195 ^a	-0.173 ^a	-0.136 ^a
Fatigability/ weakness	-0.158 ^a	-0.166 ^a	-0.186 ^a	-0.246 ^a
Hypotension	-0.042	-0.064	-0.033	-0.056
Infection and bleeding	-0.144 ^b	-0.107 ^c	-0.122 ^b	-0.089
Fluid loss	-0.270 ^a	-0.308 ^a	-0.307 ^a	-0.246 ^a
Adjusted R ²	0.28	0.30	0.29	0.29
F (6, and 602)	38.49 ^a	42.77 ^a	43.02 ^a	43.18 ^a
Standard error	30.93	29.05	28.12	33.62

NOTE: Values of β tested with F statistic, $df = 1$, and 602.

^a $p < 0.001$.

^b $p < 0.01$.

^c $p < 0.05$.

Table 22. Mean percent of responses in no effect and cannot do categories for FDC positions.

Symptom Complex ^a	Position					
	FDO		HCO		Computer	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111	100.00	0.00	100.00	0.00	100.00	0.00
113111	73.91	0.00	65.22	0.00	60.87	0.00
113121	39.13	0.00	34.78	0.00	34.78	0.00
114111	39.13	0.00	26.09	0.00	26.09	0.00
123111	60.87	0.00	34.78	8.70	21.74	8.70
211111	30.43	4.35	17.39	4.35	13.04	4.35
213111	47.83	0.00	26.09	0.00	17.39	0.00
224111	4.35	4.35	4.35	13.04	4.35	13.04
311111	39.13	0.00	21.74	0.00	21.74	0.00
312111	13.64	0.00	22.73	0.00	9.09	0.00
313111	26.09	0.00	8.70	0.00	21.74	0.00
313112	8.70	0.00	8.70	0.00	8.70	0.00
314112	4.35	4.35	4.35	4.35	8.70	4.35
314113	4.35	13.04	4.35	13.04	4.35	8.70
315113	4.35	4.35	4.35	13.04	4.35	8.70
334231	0.00	17.39	0.00	21.74	4.35	17.39
411111	26.09	0.00	26.09	0.00	39.13	0.00
412111	29.17	0.00	16.67	0.00	20.83	0.00
413111	34.78	0.00	21.74	0.00	30.43	0.00
414111	26.09	0.00	8.70	0.00	17.39	0.00
414112	13.04	0.00	8.70	0.00	4.35	0.00
415314	0.00	30.43	4.35	39.13	0.00	43.48
513111	17.39	0.00	8.70	0.00	13.04	0.00
514111	8.70	0.00	4.35	4.35	4.35	4.35
515223	0.00	8.70	0.00	17.39	0.00	13.04
515311	4.35	0.00	0.00	4.35	8.70	0.00
515431	0.00	8.70	4.35	13.04	4.35	8.70
521111	21.74	4.35	13.04	4.35	13.04	4.35
525111	4.35	4.35	4.35	8.70	0.00	8.70
535111	0.00	4.35	0.00	13.04	0.00	4.35
Average	22.73	3.61	16.82	6.08	17.24	5.07

^aIn order of severity, beginning with control symptom complex (normal).

Table 23. Summary of multiple regression analysis for FDC positions.

Symptom Component	β Weights for Position		
	FDO	HCO	Computer
Upper gastrointestinal distress	-0.147 ^a	-0.143 ^a	-0.118 ^b
Lower gastrointestinal distress	-0.230 ^a	-0.165 ^a	-0.231 ^a
Fatigability/weakness	-0.076	-0.116 ^c	-0.079
Hypotension	-0.098	-0.089	-0.143 ^b
Infection and bleeding	-0.110 ^c	-0.079	-0.050
Fluid loss	-0.350 ^a	-0.269 ^a	-0.325 ^a
Adjusted R ²	0.30	0.23	0.27
F (6, and 660)	48.02 ^a	40.31 ^a	42.14
Standard error	23.83	24.97	22.40

NOTE: Values of β tested with F statistic, $df = 1$, and 660.

^a $p < 0.001$.

^b $p < 0.01$.

^c $p < 0.05$.

Table 24. Mean percent of responses in no effect and cannot do categories for tank crew positions.

Symptom Complex ^a	Position							
	Tank		Gunner		Loader		Driver	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	82.50	0.00	85.00	0.00	77.50	0.00	92.50	0.00
113121	60.00	0.00	62.50	0.00	52.50	0.00	62.50	0.00
114111	22.50	0.00	37.50	0.00	25.00	2.50	42.50	2.50
123111	50.00	2.50	60.00	2.50	45.00	2.50	52.50	7.50
211111	70.00	0.00	72.50	0.00	72.50	0.00	85.00	0.00
213111	42.50	0.00	32.50	0.00	40.00	0.00	67.50	0.00
224111	20.00	12.50	27.50	12.50	20.00	10.00	27.50	10.00
311111	40.00	0.00	42.50	0.00	52.50	0.00	82.50	0.00
312111	42.50	0.00	42.50	0.00	42.50	0.00	57.50	0.00
313111	38.46	0.00	41.03	0.00	38.46	0.00	58.97	0.00
313112	7.50	12.50	7.50	15.00	10.00	15.00	27.50	17.50
314112	10.00	25.00	10.00	25.00	7.50	25.00	17.50	27.50
314113	2.50	30.00	2.50	32.50	0.00	35.00	10.00	37.50
315113	2.50	30.00	5.00	30.00	0.00	30.00	2.50	40.00
334231	2.50	37.50	5.00	37.50	5.00	37.50	12.50	40.00
411111	22.50	0.00	25.00	0.00	35.00	0.00	60.00	0.00
412111	47.50	0.00	42.50	0.00	40.00	0.00	62.50	0.00
413111	22.50	0.00	30.00	0.00	30.00	0.00	52.50	0.00
414111	30.00	2.50	30.00	2.50	15.00	5.00	32.50	5.00
414112	10.00	7.50	7.50	7.50	7.50	7.50	22.50	7.50
415314	0.00	60.00	0.00	65.00	0.00	60.00	7.50	60.00
513111	20.00	7.50	30.00	7.50	22.50	7.50	47.50	7.50
514111	7.50	5.00	5.00	7.50	5.00	7.50	30.00	7.50
515223	5.00	30.00	5.00	32.50	2.50	35.00	7.50	35.00
515311	0.00	25.00	7.50	25.00	2.50	27.50	5.00	25.00
515431	0.00	25.00	0.00	32.50	2.50	32.50	5.00	32.50
521111	22.50	17.50	25.00	17.50	20.00	17.50	37.50	17.50
525111	2.50	45.00	2.50	47.50	2.50	45.00	10.00	50.00
535111	2.50	32.50	2.50	35.00	2.50	32.50	7.50	40.00
Average	26.20	13.58	28.20	14.50	25.87	14.50	39.55	15.67

^a In order of severity, beginning with control symptom complex (normal).

Table 25. Summary of multiple regression analysis for tank crew positions.

Symptom Component	β Weights for Position			
	Tank Commander	Gunner	Loader	Driver
Upper gastrointestinal distress	-0.239 ^a	-0.219 ^a	-0.195 ^a	-0.141 ^a
Lower gastrointestinal distress	-0.188 ^a	-0.211 ^a	-0.181 ^a	-0.197 ^a
Fatigability/weakness	-0.229 ^a	-0.174 ^a	-0.272 ^a	-0.258 ^a
Hypotension	-0.097 ^b	-0.125 ^a	-0.069 ^c	-0.100 ^b
Infection and bleeding	-0.043	-0.019	-0.050	-0.025
Fluid loss	-0.286 ^a	-0.305 ^a	-0.311 ^a	-0.279 ^a
Adjusted R ²	0.42	0.38	0.43	0.37
F (6, and 1152)	138.84 ^a	118.15 ^a	145.64 ^a	113.44 ^a
Standard error	26.38	26.87	26.61	28.40

NOTE: Values of β tested with F statistic, $df = 1$, and 1152.

^a $p < 0.001$.

^b $p < 0.01$.

^c $p < 0.05$.

Table 26. Mean percent of responses in no effect and cannot do categories for mounted TOW crew positions.

Symptom Complex ^a	Position							
	Squad Leader		Gunner		Driver		Loader	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	80.49	2.44	70.73	2.44	85.37	2.44	70.73	4.88
113121	65.85	2.44	58.54	2.44	73.17	2.44	63.41	4.88
114111	31.71	0.00	14.63	2.44	46.34	2.44	14.63	12.20
123111	63.41	2.44	51.22	4.88	63.41	2.44	41.46	4.88
211111	80.49	2.44	75.61	2.44	85.37	2.44	70.73	2.44
213111	51.22	0.00	24.39	2.44	58.54	2.44	19.51	4.88
224111	24.39	2.44	19.51	4.88	34.15	4.88	12.20	9.76
311111	58.54	0.00	46.34	0.00	68.29	0.00	60.98	2.44
312111	41.46	0.00	34.15	0.00	53.66	0.00	34.15	0.00
313111	36.59	0.00	26.83	0.00	60.98	0.00	36.59	4.88
313112	9.76	2.44	12.20	7.32	19.51	9.76	9.76	24.39
314112	19.51	9.76	7.32	21.95	17.50	20.00	4.88	36.59
314113	12.20	14.63	7.32	31.71	9.76	29.27	4.88	63.41
315113	7.50	20.00	7.50	32.50	10.00	30.00	2.44	56.10
334231	4.88	24.39	0.00	39.02	7.32	34.15	2.44	46.34
411111	36.59	0.00	31.71	4.88	73.17	0.00	34.15	0.00
412111	60.00	0.00	50.00	0.00	67.50	0.00	37.50	2.50
413111	39.02	0.00	19.51	0.00	48.78	0.00	24.39	9.76
414111	35.00	2.50	20.00	2.50	32.50	5.00	12.50	15.00
414112	7.32	4.88	4.88	17.07	19.51	17.07	4.88	31.71
415314	7.32	31.71	2.44	53.66	2.44	49.78	0.00	73.17
513111	21.95	2.44	19.51	7.32	29.27	4.88	14.63	14.63
514111	17.07	9.76	9.76	14.63	31.71	17.07	9.76	31.71
515223	2.44	14.63	0.00	43.90	4.88	34.15	0.00	68.29
515311	9.76	12.20	2.44	21.95	7.32	14.63	2.44	51.22
515431	2.44	17.07	2.44	34.15	4.88	36.59	0.00	56.10
521111	51.22	2.44	36.59	4.88	46.34	4.88	43.90	9.76
525111	17.50	17.50	7.50	32.50	12.50	32.50	5.00	70.00
535111	7.32	12.20	4.88	29.27	12.20	29.27	0.00	56.10
Average	33.43	7.02	25.60	14.04	39.54	12.92	24.60	25.60

^aIn order of severity, beginning with control symptom complex (normal).

Table 27. Summary of multiple regression analysis for mounted TOW positions.

Symptom Component	β Weights for Position ^a			
	Squad Leader	Gunner	Loader	Driver
Upper gastrointestinal distress	-0.185 ^b	-0.181 ^b	-0.164 ^b	-0.154 ^b
Lower gastrointestinal distress	-0.108 ^b	-0.089 ^c	-0.079 ^c	-0.121 ^b
Fatigability/weakness	-0.215 ^b	-0.274 ^b	-0.345 ^b	-0.235 ^b
Hypotension	-0.084 ^c	-0.062	-0.073 ^d	-0.078 ^d
Infection and bleeding	-0.099 ^c	-0.086 ^c	-0.067 ^d	-0.112 ^b
Fluid loss	-0.262 ^b	-0.238 ^b	-0.252 ^b	-0.281 ^b
Adjusted R ²	0.33	0.34	0.42	0.35
F (6, and 1182)	98.23 ^b	103.48 ^b	141.61 ^b	107.39 ^b
Standard error	27.37	28.43	29.91	27.61

NOTE: Values of β tested with F statistic, $df = 1$, and 1182.

^aBased on 30 symptom complexes.

^b $p < 0.001$.

^c $p < 0.01$.

^d $p < 0.05$.

Table 28. Mean percent of responses in no effect and cannot do categories for ordinary tasks.

Symptom Complex ^a	Ordinary Task ^b											
	1		2		3		4		5		6	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111	46.28	0.00	40.50	0.00	42.15	0.00	45.90	0.00	41.32	0.00	52.46	0.00
113111	47.15	0.81	46.34	1.63	35.77	0.00	37.90	0.00	33.33	1.63	47.97	0.00
113121	29.84	3.23	28.23	4.84	17.89	4.06	16.13	4.03	18.70	4.06	30.64	0.81
114111	8.07	10.48	8.13	11.38	8.80	7.20	8.00	6.40	10.40	8.80	29.60	1.60
123111	28.45	8.94	25.20	12.20	15.45	8.13	10.48	8.97	12.20	10.57	34.68	3.23
211111	42.74	3.23	40.16	4.10	27.64	2.44	26.61	3.23	21.95	2.44	41.13	0.81
213111	20.33	2.44	14.63	2.44	19.36	0.81	16.00	2.40	21.77	1.61	30.40	0.80
224111	7.26	18.55	7.26	21.77	5.64	16.93	4.80	16.00	10.48	17.74	23.20	8.00
311111	34.15	2.44	29.27	1.63	28.69	1.64	30.89	0.81	33.61	0.82	39.84	0.00
312111	17.21	1.64	15.70	2.48	8.94	3.25	8.87	3.23	10.57	3.25	24.19	0.81
313111	21.14	2.44	19.01	1.65	14.75	0.82	17.21	2.46	16.39	1.64	26.02	0.00
313112	7.32	22.76	7.38	24.59	5.60	19.20	1.61	16.93	3.20	16.00	18.40	7.20
314112	8.20	33.61	9.09	34.71	3.23	28.23	4.00	25.60	4.03	25.00	13.60	13.60
314113	3.25	61.79	4.10	59.02	1.63	49.59	2.44	44.72	2.44	47.15	9.02	20.49
315113	0.81	58.54	0.81	58.54	2.42	46.77	0.81	39.84	0.00	45.97	8.07	17.74
334231	2.42	58.87	3.23	59.68	0.80	47.20	0.00	42.40	0.80	48.00	6.45	26.61
411111	17.89	3.25	15.45	5.69	21.77	0.81	31.20	1.60	31.20	2.40	32.80	1.60
412111	20.16	3.23	18.55	4.03	12.20	4.88	11.29	4.84	8.94	4.88	28.23	1.61
413111	18.03	2.46	18.03	4.10	14.52	2.42	12.00	3.20	16.93	2.42	28.80	1.60
414111	8.13	17.89	8.20	18.03	4.03	16.13	5.69	15.45	6.45	16.13	16.13	5.64
414112	4.06	22.76	3.23	25.81	4.80	20.80	3.20	21.60	5.60	23.20	12.80	8.00
415314	1.61	72.58	1.61	73.39	0.81	65.85	1.61	59.68	3.25	62.60	5.64	32.26
513111	12.20	13.82	13.01	15.45	8.13	9.76	6.45	8.07	4.88	8.94	19.36	1.61
514111	4.80	20.33	4.84	24.19	3.20	15.20	4.80	16.80	7.20	18.40	15.20	6.40
515223	4.03	62.10	4.06	70.73	1.61	50.81	0.81	41.13	0.81	48.39	1.63	20.33
515311	3.23	48.09	1.61	52.42	5.60	37.60	0.81	30.64	1.61	34.68	15.45	10.57
515431	0.82	68.03	1.64	68.03	3.25	40.65	2.44	36.59	4.88	34.96	5.74	16.39
521111	14.63	14.63	12.20	17.07	8.94	13.01	8.07	14.52	10.57	16.26	20.97	5.64
525111	1.63	60.98	1.63	60.98	0.82	50.82	0.81	43.90	2.44	47.15	8.94	17.07
535111	3.23	54.84	2.42	60.48	1.63	41.46	0.00	36.89	3.23	45.16	8.07	15.13
Average	14.64	25.17	13.52	26.70	11.00	20.22	10.69	18.39	11.64	20.01	21.85	8.22

^aIn order of severity, beginning with control symptom complex (normal).

^bFor description of tasks, see p. 48.

Table 29. Mean percent of normal performance for ordinary tasks.

Symptom Complex ^a	Ordinary Task ^b											
	1		2		3		4		5		6	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111	83.18	20.77	81.05	20.38	74.84	26.77	76.13	28.41	75.86	26.11	80.25	25.82
113111	82.44	21.87	80.62	23.28	73.23	25.82	71.55	29.49	68.95	29.17	77.94	27.19
113121	71.80	26.00	71.09	26.85	57.25	29.29	53.32	30.17	53.51	30.37	69.16	27.36
114111	52.07	28.21	50.12	28.00	44.52	27.63	35.90	28.31	45.35	29.37	65.22	30.47
123111	65.92	31.45	62.25	32.83	52.92	31.48	44.43	30.32	44.05	30.77	67.80	30.73
211111	76.71	26.31	76.13	27.29	66.89	28.10	61.02	32.27	60.39	29.08	73.79	27.11
213111	66.92	25.28	63.58	24.15	59.64	28.26	54.30	31.05	61.32	29.68	68.34	28.74
224111	48.03	29.29	45.27	31.52	37.13	28.09	30.88	27.77	36.11	31.23	61.62	30.95
311111	75.69	24.50	74.14	24.41	68.58	27.29	65.71	31.07	69.97	28.90	73.83	28.11
312111	65.07	23.78	63.02	25.14	49.15	27.41	42.70	27.86	49.12	27.76	64.71	28.05
313111	68.05	24.42	65.92	24.43	57.12	26.90	53.52	30.93	57.05	27.94	67.15	26.06
313112	42.74	30.86	41.82	31.70	33.46	27.10	26.72	24.79	32.43	26.20	54.93	30.40
314112	38.11	32.91	37.52	33.87	29.12	26.46	23.11	25.71	26.65	25.80	52.48	31.39
314113	18.41	27.80	20.91	30.12	16.34	22.75	14.90	22.25	15.15	21.61	43.80	31.42
315113	19.14	25.94	18.09	25.90	16.11	22.06	12.61	18.79	13.74	17.63	40.44	29.39
334231	19.53	26.28	19.51	27.66	16.33	20.41	10.92	15.09	14.29	19.15	36.83	31.37
411111	65.29	24.98	61.82	27.29	62.16	26.88	65.58	31.37	66.29	29.85	65.34	30.84
412111	66.29	26.05	63.32	26.62	52.37	27.04	47.37	29.38	47.87	27.86	65.50	29.12
413111	64.21	25.94	61.84	27.11	54.25	27.50	47.83	30.13	56.20	29.68	65.79	29.27
414111	46.78	29.75	47.77	30.19	36.17	26.59	30.17	26.87	35.34	28.88	56.42	29.64
414112	41.38	29.15	38.09	29.71	31.61	26.95	23.72	24.84	29.53	27.49	50.33	30.43
415314	10.95	21.64	10.99	21.85	10.17	19.16	8.59	16.85	10.84	21.37	29.92	29.09
513111	52.99	29.70	51.78	31.02	43.04	27.52	35.89	28.53	40.66	26.99	59.43	28.43
514111	42.51	29.27	41.65	30.15	34.52	25.27	28.16	26.71	33.55	28.62	53.58	29.91
515223	16.27	25.78	13.77	25.78	12.68	18.58	11.60	17.07	13.93	19.19	32.54	25.54
515311	22.51	26.59	21.47	26.79	21.73	26.23	15.15	19.04	19.24	22.59	43.87	31.72
515431	10.97	19.17	12.63	22.43	16.02	22.06	15.14	21.29	18.57	25.22	31.38	27.75
521111	56.13	31.65	53.27	32.58	46.59	30.53	40.62	31.18	42.27	31.93	60.75	30.60
525111	20.26	28.16	19.46	28.33	16.01	22.13	12.96	19.46	15.58	22.31	43.70	30.63
535111	20.70	27.14	18.21	26.50	17.14	21.28	12.03	15.76	15.84	22.94	40.41	29.88
Average	47.70		46.24		40.24		35.75		38.99		56.54	

NOTE: S.D. = standard deviation.

^aIn order of severity, beginning with control symptom complex (normal).^bFor description of tasks, see p. 48.

Table 30. Summary of multiple regression analysis for six ordinary tasks.

Symptom Component	β Weights for Tasks					
	1	2	3	4	5	6
Upper gastrointestinal distress	-0.177	-0.176	-0.172	-0.150	-0.143	-0.155
Lower gastrointestinal distress	-0.116	-0.127	-0.105	-0.107	-0.126	-0.074
Fatigability/weakness	-0.286	-0.273	-0.307	-0.337	-0.306	-0.143
Hypotension	-0.072	-0.065	--	--	--	-0.055
Infection and bleeding	-0.081	-0.074	-0.085	-0.058	-0.068	-0.091
Fluid loss	-0.234	-0.228	-0.220	-0.182	-0.213	-0.184
Adjusted R^2	0.37	0.36	0.33	0.32	0.31	0.18
F (6, and 3742)	373.69 ^a	343.70 ^a	311.97 ^a	344.46 ^a	336.31 ^a	139.58
Standard error	27.57	28.16	26.48	27.12	27.42	29.30

NOTE: Values of β tested with F statistic; $df = 1$, and 3742; significant at $p < 0.05$.

^a $p < 0.001$.

REFERENCES

- Anno, G. H., H. L. Brode, and R. Washton-Brown, *Initial Human Response to Nuclear Radiation*, Pacific-Sierra Research Corporation, Note 477, April 1982 (subsequently published as DNA-TR-81-237 and Chap. II of PSR Report 1241).
- Cronbach, L. J., "Coefficient Alpha and the Internal Structure of Tests," *Psychometrika*, Vol. 16, No. 3, September 1951, p. 297.
- Dalkey, N. C., et al., *Studies in the Quality of Life-Delphi and Decision-Making*, Heath and Company, Lexington, Massachusetts, 1972.
- Edwards, A. L., *Statistical Methods for the Behavioral Sciences*, Holt, Rinehart and Winston, New York, 1963.
- Guilford, J. P., *Psychometric Methods*, McGraw-Hill, New York, 1954.
- Kendall, M. G., *Rank Correlation Methods*, Griffin, London, 1948.
- Morgan, B. B., Jr., and L. G. Cruser, *Performance Effects of Sickness and Symptomatology: A Review of the Literature*, Report 82-1-2, Organization Research Group of Tidewater, Inc., Norfolk, Virginia, June 1982.

Appendix A

SAMPLE QUESTIONNAIRE

Appendix A includes examples of the format common to all four versions of the questionnaire with additional paragraphs and pages inserted whenever the text differed for the different types of crews. Common format for the questionnaire is:

- Demographic questions (e.g., for gun crew).
- Crew-peculiar demographic questions for FDC, tank, and TOW crews.
- Instruction sheet (e.g., for gun crew).
- Crew-peculiar instructions for FDC, tank, and TOW crews.

Also included is one example of the format for the questionnaire pages, with additional segments where the format was crew-peculiar.

DEMOGRAPHIC QUESTIONS ON GUN CREW QUESTIONNAIRE

To help us to understand the characteristics of this group, we are asking you to supply some information about your military experience. Please note that all your questionnaire responses will be strictly anonymous and there will be no attempt to link these responses to you as an individual. The answers to the information below will be used only for descriptive purposes.

Please supply the following information about yourself:

Your present grade and MOS? _____

How long have you been in the Army? _____

How long have you been in artillery? _____

Have you been in combat? Yes _____ No _____ When _____

Have you been in artillery combat? Yes _____ No _____

When _____

Have you served as a: When? How long?

Chief of Section _____

Gunner _____

Assistant Gunner _____

#1 Loader _____

Approximately how many men have you supervised on 155 SP Gun Crews?

2 5 10 20 50 More than 50

Briefly describe your military duties during the past year:

CREW-PECULIAR DEMOGRAPHIC QUESTIONS ON QUESTIONNAIRE

FOR FDC CREWS

Have you served as a: When? How long?

FDC HCO _____

FDC Computer _____

Approximately how many crewmen have you supervised in FDCs?

2 5 10 20 50 More than 50

FOR ARMOR CREWS

How long have you been in Armor? _____

Have you been in combat? Yes _____ No _____ When _____

Have you been in armor combat? Yes _____ No _____ When _____

Have you served as a: When? How long?

Tank Commander _____

Gunner _____

Loader _____

Driver _____

Approximately how many crewmen have you supervised in Armor?

2 5 10 20 50 More than 50

FOR TOW CREWS

How long have you been in anti-armor? _____

Have you been in combat? Yes _____ No _____ When _____

Have you been in anti-armor combat? Yes _____ No _____ When _____

Have you served as a: When? How long?

Squad Leader _____

Gunner _____

Loader _____

Driver _____

Approximately how many crewmen have you supervised in Mounted TOWs?

2 5 10 20 50 More than 50

INSTRUCTION SHEET FOR GUN CREW QUESTIONNAIRE

INSTRUCTIONS

You are asked to give your best judgments regarding the ability of combat-ready soldiers to perform basic tasks under various conditions of illness. Performance is defined here as the amount of time needed to do a task such as load, arm, aim, track, etc.

On the questionnaire will be listed a set of several basic military and nonmilitary tasks. For convenience, a "usual" time is listed next to each task for you to use as a reference. The "usual" time refers to the number of seconds needed for a healthy (nonsick) crew member to perform that task.

I will describe several different sets of symptoms which are associated with various dosages and time intervals of radiation.

For each estimate, think about the symptoms described. On the basis of your experience with soldiers you have supervised and observed, estimate the number of seconds you think it would take for a typical or average soldier to perform the task. Do not worry about being consistent from symptom to symptom - rather just consider the particular symptom set and task you are rating and use your best judgment.

In addition, there are no right or wrong answers for what we are asking. Different individuals may react differently to the various levels of illness.

For the purpose of this questionnaire assume that this is the situation:

- The crew has been actively engaged in a battle in which tactical nuclear weapons have been used and the crew has been exposed to radiation.
- Crew members are all well trained and experienced, are well led, and motivated to do their best. They expect a call for fire at this time and are prepared for it.
- It is daylight and the crew members are not wearing MOPP gear or other protective gear (such as masks).
- The crew is called upon to perform an immediate suppression mission on an unplanned target, where responding quickly is essential.

- The weapon is a 155mm self-propelled Howitzer M-109. Obtaining the projectile, cutting the powder and setting the fuze do not delay other tasks.
- A change of 100 mil in both azimuth and elevation is required for the maneuver.

Here is an example of the format you will be using to make your ratings:

	The usual time for each task is about:	How much longer do you think it would take a crew man to do each task if he had these symptoms?		
		No increase in time	Increase in time (sec)	Could not do it at all
Task 1	x sec			
Task 2	y sec			
Task 3	z sec			

For each rating you have three options. Given the symptom and task you may feel that:

- (1) the task would not take any longer from the usual time. In that case, check the box in the column labelled "No increase in time."
- (2) the task would take longer than usual. In that case, estimate the number of seconds you think it would take and write that number in the column labelled "Increase in time."
- (3) the task could not be performed. In this case, you would check the box in the column labelled "Could not do it at all."

For three of the nonmilitary tasks, you are asked to make a somewhat different judgment, which is how many times you could continue to perform the task. When we work through the example, I will describe this task more.

Finally, after you have made your estimates, you are asked to estimate your confidence on the following scale:

1 None	2 Not Much	3 Some	4 A Lot	5 Certain
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Please rate how much confidence you have by circling the appropriate number.

CREW-PECULIAR INSTRUCTIONS FOR FDC, TANK, AND TOW CREW QUESTIONNAIRES

FDC CREWS

- The crew is called upon to perform an immediate suppression mission on an unplanned target, where responding quickly is essential.
- The target location is given in grid coordinates.
- A manual procedure with handheld calculator assist is used. No FADAC or TACFIRE support.

TANK CREWS

- Defensive mission. Start from turret defilade
- The action involves acquiring target, advancing 20 ft., stop, and fire.
- Stationary tank/moving target. Precision range.

TOW CREWS

For the purposes of this questionnaire assume that this is the situation:

- It is daylight and the crew members are not wearing MOPP gear or other protective gear (such as masks).
- The crew has been actively engaged in a battle in which tactical nuclear weapons have been used and the crew has been exposed to radiation, but are not otherwise injured and there has been no damage to their equipment.
- Crew members are all well trained and experienced, are well led, and motivated to do their best. They expect an engagement at this time and are prepared for it.
- The crew has positioned their vehicle on the approach route of a formation of enemy tanks. They intend to engage the tanks one-by-one, starting at maximum range, and continue firing until forced to withdraw.
- They will move from one firing position to another between reloadings, but the vehicle will be stationary during reloading.
- Firing positions are somewhat more than a hundred meters apart, and are unprepared but well marked.

On one of the military tasks you are asked to estimate the ability of a typical crew member to track the target at a distance of 3 km during missile flight when he is sick. For this question, assume that a healthy crew member has a 90% chance of staying on the target during the last 6 seconds of missile flight.

Here is an example of the format you will be using to make your ratings:

Estimate the chance of staying on the target during the last 6 seconds of flight (90% usual chance) _____.

For this question please enter in the space provided your estimate of the chance that the sick crew member would stay on the target during the last 6 seconds of flight. If you think that he could not track at all during the last 6 seconds, then please write in "0".

In addition to the TOW tasks, you will also be asked to make ratings for several ordinary (nonmilitary) tasks. I will describe these tasks when we step through the example. Here is the format for four of these tasks:

1. How many flights of stairs could a crewman climb quickly before becoming breathless?
_____ flights
2. How long could a crewman keep walking at a brisk pace before his legs get tired?
_____ minutes
3. How many heavy boxes could a crewman keep lifting from the floor to a table before he would have to stop and rest?
_____ boxes
4. How long would it take a crewman to open a simple 3-number combination lock?
_____ seconds

Please take a pencil now and write in how long or how many times you think a typical crewman could do these ordinary tasks if he were not sick.

Finally, after you have made your estimates, you are asked to estimate your confidence on the following scale:

1	2	3	4	5
None	Not Much	Some	A Lot	Certain

Please rate how much confidence you have by circling the appropriate number.

EXAMPLE OF SYMPTOM COMPLEX PAGE FROM GUN CREW QUESTIONNAIRE

312111

DESCRIPTION OF ILLNESS:

Nauseated; considerable sweating; swallows frequently to avoid vomiting; somewhat tired with mild weakness.

CREW TASKS

TASKS	The usual time for each task is about:	How much longer do you think it would take a crewman to do each task if he had these symptoms?		
		No increase in time	Increase in time (sec)	Could not do it at all
CREWMEMBER				
CHIEF OF SECTION				
Receive fire order and call quadrant elevation, deflection projectile, charge, fuze	1 sec			
GUNNER				
Set deflection	7 sec			
Reverse tube and level bubble	7 sec			
ASSISTANT GUNNER				
Set quadrant elevation	7 sec			
Elevate tube and level bubble	1 sec			
#1 LOADER				
Lift projectile to tray	2 sec			
Position and operate hydraulic rammer	5 sec			
Place charge and release breech block	2 sec			
Insert primer and close firing lock	1.5 sec			
Attach lanyard and fire	1.5 sec			
Swab tube and inspect bore	1 sec			

ORDINARY TASKS

Climb two flights of stairs briskly	15 sec			
Lift five heavy boxes of books from the floor to a 3 ft high table	20 sec			

- How many flights of stairs could a crewman climb quickly before becoming breathless? _____ flights
- How long could a crewman keep walking at a brisk pace before his legs get tired? _____ minutes
- How many heavy boxes could a crewman keep lifting from the floor to a table before he would have to stop and rest? _____ boxes
- How long would it take a crewman to open a single 3-number combination lock? _____ seconds

How Much Confidence Do You Have in Your Estimates?

1 None	2 Not Much	3 Some	4 A lot	5 Certain
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FDC CREW-PECULIAR TASKS ON SAMPLE SYMPTOM COMPLEX

PAGE FROM QUESTIONNAIRE

CREW TASKS

TASKS CREWMEMBER	The usual time for each task is about:	How much longer do you think it would take a crewman to do each task if he had these symptoms?		
		No increase in time	Increase in time (sec)	Could not do it at all
<u>FIRE DIRECTION OFFICER</u>				
Announce fire order	2 sec			
Review calculations	5 sec			
Announce fire mission	3 sec			
<u>HORIZONTAL CONTROL OPERATOR</u>				
Plot target location on chart	1 sec			
Orient deflection protractor	1 sec			
Read range, deflection by protractor	3 sec			
<u>COMPUTER</u>				
Calculate fuze setting, deflection and quadrant elevation	15 sec			
Announce fire commands to guns	3 sec			

TANK CREW-PECULIAR TASKS ON SAMPLE SYMPTOM COMPLEX

PAGE FROM QUESTIONNAIRE

CREW TASKS

TASKS CREWMEMBER	The usual time for each task is about:	How long do you think it would take a crew man to do each task if he had these symptoms?		
		No increase in time	Amount of time (sec)	Could not do it at all
<u>TANK COMMANDER</u>				
Issue fire command	1 sec			
Range the target	5 sec			
Depress and lay gun for direction	3 sec			
Issue subsequent fire command	4 sec			
<u>GUNNER</u>				
Identify target	1 sec			
Aim and fire	6 sec			
Apply fire adjustment and fire	7 sec			
<u>LOADER</u>				
Arm	1 sec			
Load and arm	5 sec			
<u>DRIVER</u>				
Stop	4 sec			

TOW CREW-PECULIAR TASKS ON SAMPLE SYMPTOM COMPLEX

PAGE FROM QUESTIONNAIRE

CREW TASKS

TASKS	The usual time for each task is about:	How long do you think it would take a crewman to do each task if he had these symptoms?		
		No increase in time	Amount of time (sec)	Could not do it at all
CREWMEMBER				
<u>SQUAD LEADER</u>				
Designate azimuth and target	4 sec			
Command driver to firing position	2 sec			
<u>GUNNER</u>				
Set superelevation, erect, slew 10° to designated azimuth	17 sec			
Acquire targets	1 sec			
Adjust magnification, identify, and arm	4 sec			
Select target and fire	3 sec			
<u>DRIVER</u>				
From standstill, drive forward 40 ft and stop	20 sec			
<u>LOADER</u>				
Reload	60 sec			
Rearrange ready rack	60 sec			

Appendix B

SYMPTOM DESCRIPTIONS

Appendix B includes a list of symptom categories and descriptions in order of severity. These symptom sets were used to construct symptom complex descriptions and their corresponding six-digit numbers.

The symptom categories and their descriptions were devised principally by George Anno of PSR, and other members of the IDP Core Group (Table B.1). Six symptom categories are described in symptomatic terminology. Each of these categories contains a list of five symptoms ranging from the least severe (number 1) to the most severe (number 5).

Table B.2 lists the 30 symptom complexes used for all crews in order of appearance on the questionnaire. Ten additional symptom complexes are given at the end of the table. These symptom complexes were used on the TOW questionnaire, making a total of 40 symptom complexes for that crew.

Table B.1. Symptoms in order of severity used on questionnaire.

Upper gastrointestinal distress

1. No effect.
2. Upset stomach; clammy and sweaty; mouth waters and swallows frequently.
3. Nauseated; considerable sweating; swallows frequently to avoid vomiting.
4. Vomited once or twice; nauseated and may vomit again.
5. Vomited several times including the dry heaves; severely nauseated and will soon vomit again.

Lower gastrointestinal distress

1. No effect.
2. Feels uncomfortable urge to defecate.
3. Occasional diarrhea; recently defecated and may again.
4. Frequent diarrhea and cramps; defecated several times and will again soon.
5. Uncontrollable diarrhea and painful cramps.

Fatigability/weakness

1. No effect.
2. Somewhat tired with mild weakness.
3. Tired, with moderate weakness.
4. Very tired and weak.
5. Exhausted with almost no strength.

Hypotension

1. No effect.
2. Slightly light-headed.
3. Unsteady upon standing quickly.
4. Faints upon standing quickly.
5. In shock: breathes rapidly and shallowly, motionless, skin cold, clammy, and very pale.

Infection and bleeding

1. No effect.
2. Mild fever and headache--like starting to come down with flu.
3. Joints ache, considerable sweating; moderate fever; does not want to eat; sores in mouth/throat.
4. Shakes and chills and aches all over; difficulty in stopping any bleeding.
5. Delirious, overwhelming infections; cannot stop any bleeding.

Fluid loss and electrolyte imbalance

1. No effect.
 2. Thirsty and has dry mouth; weak and faint.
 3. Very dry mouth and throat, headache, rapid heartbeat and may faint with moderate exertion.
 4. Extremely dry mouth, throat, skin and very painful headache; has difficulty moving; short of breath, burning skin and eyes.
 5. Prostrate.
-

Table B.2. List of symptom complexes used on questionnaires.

Symptom Complex	Description
411111	Vomited once or twice; nauseated and may vomit again.
515431	Vomited several times including the dry heaves; severely nauseated and will soon vomit again; exhausted with almost no strength; faints upon standing quickly; joints ache, considerable sweating; moderate fever; does not want to eat; sores in mouth/throat.
114111	Very tired and weak.
515311	Vomited several times including the dry heaves; severely nauseated and will soon vomit again; exhausted with almost no strength; unsteady upon standing quickly.
213111	Upset stomach; clammy and sweaty; mouth waters and swallows frequently; tired, with moderate weakness; strength somewhat reduced.
413111	Vomits once or twice; (up to 4 episodes); nauseated and may vomit again. Tired, with moderate weakness.
311111	Nauseated; considerable sweating; swallows frequently to avoid vomiting.
313111	Nauseated; considerable sweating; swallows frequently to avoid vomiting; tired, with moderate weakness.
515223	Vomited several times including the dry heaves; severely nauseated and will soon vomit again; exhausted with almost no strength; slightly light-headed; mild fever and headache--like starting to come down with flu; very dry mouth and throat, headache; rapid heartbeat and may faint with moderate exertion.
414112	Vomited once or twice; nauseated and may vomit again; very tired and weak; thirsty and has dry mouth; weak and faint.
535111	Vomited several times including the dry heaves; severely nauseated and will soon vomit again; occasional diarrhea, recently defecated and may again; exhausted with almost no strength.
112111	Somewhat tired with mild weakness.
514111	Vomited several times including the dry heaves; severely nauseated and will soon vomit again; very tired and weak.
313112	Nauseated; considerable sweating; swallows frequently to avoid vomiting; tired, with moderate weakness; thirsty and has dry mouth; weak and faint.
315113	Nauseated; considerable sweating; swallows frequently to avoid vomiting; exhausted with almost no strength; very dry mouth and throat, headache; rapid heartbeat and may faint with moderate exertion.

Table B.2. Continued.

Symptom Complex	Description
513111	Vomited several times including the dry heaves; severely nauseated and will soon vomit again; tired, with moderate weakness.
123111	Feels uncomfortable urge to defecate; tired, with moderate weakness.
334231	Nauseated; considerable sweating; swallows frequently to avoid vomiting; occasional diarrhea and cramps, defecated several times and will again soon; very tired and weak; slightly light-headed; joints ache, considerable sweating; moderate fever; does not want to eat; sores in mouth/throat.
113111	Tired, with moderate weakness.
521111	Vomits several times including the dry heaves; severely nauseated and will soon vomit again; feels uncomfortable urge to defecate.
113121	Tired, with moderate weakness; mild fever and headache--like starting to come down with flu.
211111	Upset stomach; clammy and sweaty; mouth waters and swallows frequently.
224111	Upset stomach; clammy and sweaty; mouth waters and swallows frequently; feels uncomfortable urge to defecate. Very tired and weak.
415314	Vomited once or twice; nauseated and may vomit again; exhausted with almost no strength; unsteady upon standing quickly; extremely dry mouth, throat, skin and very painful headache; has difficulty moving; short of breath; burning skin and eyes.
312111	Nauseated; considerable sweating, swallows frequently to avoid vomiting; somewhat tired with mild weakness.
314112	Nauseated; considerable sweating; swallows frequently to avoid vomiting; very tired and weak; thirsty and has dry mouth; weak and faint.
314113	Nauseated; considerable sweating; swallows frequently to avoid vomiting; very tired and weak; very dry mouth and throat, headache; rapid heartbeat and may faint with moderate exertion.
412111	Vomited once or twice; nauseated and may vomit again; somewhat tired with mild weakness.
414111	Vomited once or twice; nauseated and may vomit again; very tired and weak.
525111	Vomited several times including the dry heaves; severely nauseated and will soon vomit again; feels uncomfortable urge to defecate; exhausted with almost no strength.

Table B.2. Continued.

Symptom Complex	Description
111121	Mild fever and headache--like starting to come down with the flu.
112121	Somewhat tired with mild weakness; mild fever and headache--like starting to come down with flu.
212111	Upset stomach; clammy and sweaty; mouth waters and swallows frequently; somewhat tired with mild weakness.
112131	Somewhat tired with mild weakness; joints ache, considerable sweating; moderate fever, does not want to eat; sores in mouth/throat.
111131	Joints ache, considerable sweating; moderate fever; does not want to eat; sores in mouth/throat.
113131	Tired, with moderate weakness; joints ache; considerable sweating; moderate fever; does not want to eat; sores in mouth and throat.
214112	Upset stomach; clammy and sweaty; mouth waters and swallows frequently; very tired and weak; thirsty and has dry mouth; weak and faint.
314111	Nauseated; considerable sweating; swallows frequently to avoid vomiting; very tired and weak.
214113	Upset stomach; clammy and sweaty; mouth waters and swallows frequently; very tired and weak; very dry mouth and throat; headache; rapid heartbeat and may faint with moderate exertion.
114112	Tired and weak; thirsty and has dry mouth; weak and faint.

Appendix C

RESULTS OF FOLLOW-UP QUESTIONNAIRE

The tables in this appendix summarize the results of the questionnaire that was administered a second time at the four sites. All respondents had completed the survey questionnaire before taking the revisit questionnaire. The number of respondents in each of the four crews who received revisit questionnaires was as follows:

Artillery gun	6
FDC	10
Tank	27
TOW	40

All data were collected in a group administration similar to procedures for the original questionnaires.

Table C.1 shows the percentage of responses in each of the four groups for questions regarding how symptom descriptions were interpreted by respondents. The crews were generally consistent in their interpretation of these questions, as can be seen by looking at the given percentages. Respondents were also asked to identify symptoms that would have a negligible or serious effect on specific military and nonmilitary tasks by marking each task with an "X" (serious) or "O" (negligible).

Tables C.2 through C.5 present the percent of respondents in each crew who believed that specific military tasks would be seriously degraded by the symptoms listed. Tables C.6 through C.9 show the percent of respondents who believed that symptom effects would be negligible on performance of the tasks.

On these tables the different tasks are shown as row entries at each symptom complex. The tasks referenced by the table for questionnaires 1, 2, and 3 are the same as on the survey questionnaire (see Table 6, p. 60). For questionnaire 4 the tasks used on the survey were broken down into 18 smaller units, as follows:

1. Designate azimuth.
2. Designate target.
3. Command driver to firing position.
4. Set superelevation.
5. Erect.
6. Skew 10 deg to designated target.
7. Acquire targets.
8. Adjust magnification.
9. Identify.
10. Arm.
11. Select target.
12. Fire.
13. Track target.
14. Start from standstill.
15. Drive forward 40 m.
16. Stop.
17. Reload.
18. Rearrange ready rack.

Tables C.10 and C.11 show the percentage of respondents across the artillery gun, FDC, and tank crews who estimated that performance of the six ordinary tasks would be seriously or negligibly affected. Respondents from the TOW crew were not asked to rate these tasks. The six tasks, shown sequentially across each row, were the same as on the original survey.

Table C.1. Results of responses to revisit questionnaire for four crews.

		Crew Responses (%)			
Questions on Symptom Descriptions		Artillery Gun	FDC Tank	TOW	
WHEN WE SAID:	DID THAT MEAN TO YOU: (Check one)				
Vomited once or twice; nauseated and may vomit again	Vomiting occurred during the task	50.0	33.3	77.8	22.5
	Vomited before and after but not during the task	50.0	66.7	22.2	77.5
Vomited several times, including the dry heaves; severely nauseated and will soon vomit again	Vomiting occurred during the task	66.7	55.6	76.0	47.5
	Vomited before and after, but not during the task	33.3	44.4	24.0	52.5
Occasional diarrhea, recently defecated and may again	Defecating during the task	16.7	22.2	56.0	20.5
	Defecated before and after, but not during the task	83.3	77.8	44.0	79.5
Frequent diarrhea and cramps, defecated several times and will again soon	During the task:				
	Defecated	0.0	0.0	3.7	3.1
	Had cramps	66.7	75.0	18.5	56.8
	Both	33.3	25.0	77.8	35.1
	Before and after, but not during the task:				
	Defecated	0.0	28.6	17.6	19.4
	Had cramps	0.0	0.0	11.8	5.7
	Both	100.0	71.4	70.6	71.0
Difficulty in stopping any bleeding	Bleeding	66.7	66.7	63.0	22.5
	Not bleeding	16.7	11.1	14.3	15.0
	Don't know	16.7	22.2	22.2	42.5
Don't want to eat	Must be pretty sick	66.7	77.8	74.1	87.5
	Don't know	33.3	22.2	25.9	12.5
Dizziness upon standing quickly	Leaders are dizzy	100.0	....	60.7	60.0
	Leaders are not dizzy	0	....	39.1	40.0
	Tank commanders are dizzy	100.0	....	56.7	70.6
	Tank commanders are not dizzy	0.0	....	43.3	29.4
Faints upon standing quickly	Leaders faint	100.0	....	72.7	76.3
	Leaders do not faint	0.0	....	27.3	23.7
	Tank commanders faint	100.0	....	58.8	45.0
	Tank commanders do not faint	0.0	....	41.2	55.0
Weak and faint	Faint	16.7	0.0	19.6	12.8
	If careful, can keep from fainting	83.3	77.8	59.6	74.4
	Don't faint	0.0	22.2	1.7	9.1
	Only leaders faint	0.0	....	11.1	5.7
May faint with modest exertion	Faint	3.0	11.1	17.6	17.6
	If careful, can keep from fainting	36.7	77.8	31.7	72.6
	Don't faint	11.7	11.1	2.4	2.1
	Only leaders faint	14.5	....	1.1	0.0

Table C.1. Continued.

Questions on Symptom Descriptions		Crew Responses (%)			
		Artillery Gun	FDC	Tank	TOW
Headache	Affects aiming and tracking targets	33.3	0.0	51.9	42.5
	Affects calculating	0.0	66.7	32.3	23.1
	Affects attention and concentration	66.7	77.8	66.7	64.1
	Affects aggressiveness	16.7	77.8	44.4	30.8
	Doesn't matter	0.0	11.1	14.8	10.5
Very painful headache	Affects aiming and tracking targets	50.0	0.0	66.7	50.0
	Affects calculating	0.0	66.7	63.0	30.0
	Affects attention and concentration	66.7	88.9	70.4	67.5
	Affects aggressiveness	16.7	66.7	51.9	25.0
	Doesn't matter	0.0	11.1	7.4	5.1
Joint aches	Affects everybody	66.7	44.4	63.0	50.0
	Affects only those who have to move around a lot	33.3	0.0	22.2	27.5
	Affects only those who have to move heavy objects	0.0	11.1	7.4	12.5
	Doesn't matter	0.0	44.4	7.4	10.0
Aches all over	Affects everybody	83.3	44.4	77.8	62.5
	Affects only those who have to move around a lot	16.7	11.1	7.4	20.0
	Affects only those who have to move heavy objects	0.0	11.1	7.4	10.0
	Doesn't matter	0.0	33.3	7.4	7.5
Has difficulty moving	Affects everybody	83.3	55.6	74.1	50.0
	Affects only those who have to move around a lot	16.7	11.1	16.5	35.0
	Affects only those who have to move heavy objects	0.0	11.1	0.0	10.0
	Doesn't matter	0.0	22.2	7.4	5.0

Table C.2. Percent of responses in serious effect category for military tasks on artillery gun crew revisit questionnaire (6 respondents).

Symptom Description	Task Number											Mean Percent
	1	2	3	4	5	6	7	8	9	10	11	
1 UPSET STOMACH	16.7	0.0	0.0	0.0	0.0	66.7	0.0	0.0	0.0	0.0	50.0	12.1
2 GLAUCY AND SWEATY	0.0	0.0	0.0	0.0	0.0	66.7	16.7	16.7	16.7	0.0	16.7	12.1
3 MOUTH WATER; SWALLOW FREQUENTLY	50.0	0.0	0.0	0.0	0.0	50.0	16.7	0.0	0.0	0.0	16.7	12.1
4 NAUSEATED	33.3	0.0	0.0	0.0	16.7	66.7	33.3	16.7	0.0	0.0	33.3	18.2
5 CONSIDERABLE SWEATING	0.0	33.3	16.7	16.7	16.7	66.7	50.0	33.3	0.0	0.0	0.0	21.2
6 SWALLOW FREQUENTLY TO AVOID VOMITING	66.7	16.7	16.7	16.7	16.7	50.0	50.0	33.3	16.7	0.0	16.7	27.3
7 VOMITED MORE OR TWICE; MAY AGAIN	33.3	16.7	16.7	16.7	33.3	66.7	50.0	33.3	33.3	0.0	16.7	28.8
8 VOMITED SEVERAL TIMES; DRY-HEAVES	66.7	50.0	50.0	50.0	33.3	100.0	66.7	50.0	33.3	16.7	33.3	50.0
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	0.0	0.0	0.0	0.0	0.0	66.7	33.3	16.7	0.0	0.0	0.0	15.2
10 OCCASIONAL DIARRHEA; FREQUENTLY DEFECATED	16.7	0.0	0.0	0.0	0.0	83.3	33.3	33.3	0.0	0.0	0.0	15.2
11 FREQUENT DIARRHEA AND CRAMPS	33.3	16.7	16.7	16.7	16.7	83.3	33.3	33.3	16.7	16.7	33.3	28.8
12 UNCONTROLLABLE DIARRHEA; PAINFUL CRAMPS	33.3	16.7	16.7	16.7	33.3	83.3	50.0	66.7	33.3	16.7	50.0	37.9
13 SOMEWHAT TIRED WITH A MILD WEAKNESS	16.7	0.0	0.0	0.0	0.0	83.3	16.7	0.0	16.7	0.0	0.0	12.1
14 TIRED WITH MODERATE WEAKNESS	16.7	16.7	0.0	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0	9.1
15 VERY TIRED AND WEAK	0.0	0.0	0.0	0.0	0.0	100.0	66.7	50.0	16.7	16.7	16.7	24.2
16 EXHAUSTED WITH ALMOST NO STRENGTH	50.0	33.3	33.3	33.3	33.3	100.0	83.3	66.7	33.3	16.7	33.3	47.0
17 SLIGHTLY LIGHTHEADED	33.3	16.7	0.0	0.0	0.0	33.3	33.3	0.0	0.0	0.0	0.0	10.6
18 UNSTEADY UPON STANDING QUICKLY	0.0	0.0	16.7	16.7	16.7	66.7	0.0	16.7	0.0	0.0	0.0	12.1
19 FAINTS UPON STANDING QUICKLY	33.3	16.7	16.7	16.7	16.7	100.0	50.0	33.3	16.7	16.7	33.3	31.8
20 MILD FEVER AND HEADACHE	16.7	16.7	33.3	16.7	0.0	33.3	16.7	0.0	0.0	0.0	0.0	12.1
21 JOINTS ACHES	0.0	0.0	16.7	0.0	16.7	50.0	33.3	16.7	0.0	0.0	0.0	12.1
22 UNSTOPPABLE SWEATING	0.0	16.7	0.0	0.0	0.0	50.0	16.7	0.0	0.0	0.0	0.0	7.6
23 MODERATE FEVER	0.0	0.0	0.0	0.0	0.0	33.3	16.7	0.0	0.0	0.0	16.7	6.1
24 DOESN'T WANT TO EAT	0.0	0.0	0.0	0.0	0.0	50.0	16.7	16.7	0.0	0.0	0.0	7.6
25 SORES IN MOUTH/THROAT	50.0	16.7	16.7	16.7	16.7	33.3	16.7	16.7	16.7	16.7	16.7	21.2
26 SHAKES AND CHILLS	33.3	33.3	50.0	33.3	50.0	83.3	33.3	33.3	33.3	33.3	33.3	40.9
27 ACHES ALL OVER	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	10.6
28 DIFFICULTY IN STOPPING BLEEDING	50.0	16.7	16.7	16.7	16.7	83.3	33.3	16.7	16.7	16.7	33.3	28.8
29 THIRSTY AND HAS DRY MOUTH	50.0	0.0	0.0	0.0	0.0	33.3	16.7	0.0	0.0	0.0	0.0	9.1
30 WEAK AND FAINT	33.3	0.0	0.0	0.0	0.0	66.7	50.0	16.7	0.0	0.0	0.0	15.2
31 VERY DRY MOUTH AND THROAT	50.0	0.0	0.0	0.0	0.0	33.3	16.7	0.0	0.0	0.0	0.0	4.1
32 HEADACHE	16.7	0.0	16.7	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	4.5
33 RAPID HEARTBEAT	16.7	0.0	16.7	0.0	0.0	66.7	33.3	16.7	0.0	0.0	16.7	15.2
34 MAY FAINT WITH MODERATE EXERTION	33.3	0.0	0.0	0.0	0.0	66.7	50.0	33.3	0.0	0.0	0.0	16.7
35 EXTREMELY DRY MOUTH, THROAT, SKIN	50.0	0.0	0.0	0.0	0.0	33.3	16.7	0.0	0.0	0.0	0.0	9.1
36 VERY PAINFUL HEADACHE	66.7	16.7	33.3	16.7	16.7	66.7	50.0	16.7	16.7	16.7	16.7	30.3
37 DIFFICULTY MOVING	16.7	16.7	33.3	16.7	33.3	100.0	83.3	50.0	33.3	33.3	33.3	40.9
38 SHORT OF BREATH	50.0	16.7	16.7	16.7	16.7	66.7	50.0	16.7	16.7	0.0	0.0	24.2
39 BURNING SKIN AND EYES	50.0	66.7	33.3	66.7	33.3	66.7	33.3	16.7	16.7	16.7	16.7	37.9
Average	27.8	11.5	12.4	10.3	11.1	64.1	33.8	19.7	9.8	6.0	13.7	20.0

Table C.3. Percent of responses in serious effect category for military tasks on FDC revisit questionnaire (10 respondents).

Symptom Description	Task Number								Mean	Percent
	1	2	3	4	5	6	7	8		
1 UPSET STOMACH	0.0	10.0	0.0	30.0	0.0	0.0	20.0	10.0	10.0	3.8
2 CLANNY AND SWEATY	0.0	10.0	0.0	10.0	0.0	0.0	20.0	10.0	10.0	6.3
3 MOUTH WATER; SWALLOWS FREQUENTLY	30.0	0.0	70.0	0.0	0.0	20.0	10.0	50.0	50.0	16.3
4 NAUSEATED	20.0	30.0	10.0	30.0	0.0	10.0	40.0	20.0	20.0	20.0
5 CONSIDERABLE SLEETING	0.0	10.0	0.0	30.0	0.0	10.0	20.0	10.0	10.0	10.0
6 SWALLOWS FREQUENTLY TO AVOID VOMITING	40.0	20.0	30.0	10.0	0.0	20.0	20.0	60.0	60.0	29.0
7 VOMITED MORE OR TWICE; MAY AGAIN	30.0	30.0	20.0	30.0	20.0	30.0	40.0	40.0	40.0	30.0
8 VOMITED SEVERAL TIMES; DRY-HEAVES	40.0	30.0	30.0	30.0	20.0	30.0	50.0	50.0	50.0	35.0
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	0.0	10.0	0.0	20.0	0.0	20.0	40.0	10.0	10.0	12.5
10 OCCASIONAL DIARRHEA; RECENTLY DEFECATED	10.0	20.0	10.0	20.0	0.0	20.0	40.0	10.0	10.0	16.3
11 FREQUENT DIARRHEA AND CLANPS	20.0	40.0	10.0	30.0	20.0	30.0	30.0	10.0	10.0	21.3
12 UNCONTROLLABLE DIARRHEA; PAINFUL CRAMPS	20.0	40.0	20.0	50.0	30.0	50.0	50.0	20.0	20.0	35.0
13 SOMEWHAT TIRED WITH A MILD WEAKNESS	0.0	10.0	0.0	10.0	0.0	10.0	30.0	10.0	10.0	8.8
14 TIRED WITH MODERATE WEAKNESS	0.0	10.0	0.0	20.0	0.0	10.0	30.0	20.0	20.0	11.3
15 VERY TIRED AND WEAK	10.0	10.0	10.0	30.0	0.0	10.0	30.0	10.0	10.0	13.8
16 EXHAUSTED WITH ALMOST NO STRENGTH	10.0	20.0	10.0	30.0	70.0	30.0	40.0	20.0	20.0	22.5
17 SEVERELY LIGHT-HEADED	20.0	20.0	10.0	30.0	10.0	30.0	50.0	20.0	20.0	23.8
18 UNSTEADY UPON STANDING QUICKLY	10.0	20.0	10.0	30.0	20.0	30.0	30.0	10.0	10.0	20.0
19 FAINTS UPON STANDING QUICKLY	10.0	30.0	10.0	30.0	20.0	30.0	30.0	10.0	10.0	21.3
20 MILD FEVER AND HEADACHE	0.0	10.0	0.0	10.0	0.0	20.0	40.0	10.0	10.0	11.3
21 JOINTS ACID	10.0	20.0	10.0	40.0	20.0	20.0	40.0	10.0	10.0	21.3
22 CONSIDERABLE SWEATING	0.0	0.0	0.0	40.0	0.0	10.0	10.0	10.0	10.0	8.8
23 MODERATE FEVER	0.0	10.0	0.0	30.0	0.0	20.0	30.0	10.0	10.0	12.5
24 DOESN'T WANT TO EAT	0.0	0.0	0.0	20.0	0.0	10.0	20.0	20.0	20.0	8.8
25 SORES IN MOUTH/THROAT	60.0	10.0	50.0	10.0	0.0	30.0	10.0	80.0	80.0	31.3
26 SHAKES AND CHILLS	10.0	10.0	0.0	50.0	20.0	30.0	40.0	10.0	10.0	21.3
27 ACHES ALL OVER	10.0	20.0	10.0	40.0	20.0	20.0	30.0	10.0	10.0	20.0
28 DIFFICULTY IN STOPPING BLEEDING	30.0	30.0	20.0	50.0	40.0	20.0	40.0	20.0	20.0	31.3
29 THIRSTY AND HAS DRY MOUTH	60.0	0.0	40.0	10.0	0.0	30.0	0.0	70.0	70.0	26.3
30 WEAK AND FAINT	10.0	30.0	10.0	30.0	10.0	20.0	30.0	10.0	10.0	18.8
31 VERY DRY MOUTH AND THROAT	70.0	0.0	40.0	20.0	0.0	20.0	0.0	80.0	80.0	28.8
32 HEADACHE	10.0	30.0	20.0	20.0	20.0	30.0	60.0	20.0	20.0	28.8
33 RAPID HEATLAP	10.0	20.0	10.0	30.0	20.0	10.0	20.0	20.0	20.0	17.5
34 MAY FAINT WITH MODERATE EXERTION	20.0	20.0	10.0	30.0	20.0	30.0	30.0	20.0	20.0	22.5
35 EXTREMELY DRY MOUTH, THROAT, SKIN	70.0	10.0	50.0	10.0	10.0	20.0	10.0	50.0	50.0	28.8
36 VERY PAINFUL HEADACHE	30.0	40.0	30.0	40.0	40.0	40.0	80.0	30.0	30.0	41.3
37 DIFFICULTY MOVING	20.0	10.0	10.0	50.0	30.0	0.0	30.0	10.0	10.0	20.0
38 SHORT OF BREATH	30.0	10.0	30.0	20.0	0.0	20.0	20.0	40.0	40.0	21.3
39 BURNING CRIT AND EYES	40.0	40.0	20.0	30.0	50.0	50.0	60.0	30.0	30.0	46.3
Average	20.0	17.2	14.4	28.2	11.8	21.5	31.3	24.6	24.6	21.1

Table C.4. Percent of responses in serious effect category for military tasks on tank crew revisit questionnaire (27 respondents).

Symptom Description	Task Number										Mean	
	1	2	3	4	5	6	7	8	9	10	Percent	Percent
1 UPSET STOMACH	11.1	7.4	7.4	3.7	7.4	0.0	11.1	0.0	18.5	11.1	7.8	
2 CLAMMY AND SWEATY	7.4	14.8	11.1	7.4	7.4	11.1	14.8	7.4	3.7	7.4	9.3	
3 MOUTH WATER; SALIVATES FREQUENTLY	25.9	3.7	7.4	29.6	0.0	3.7	0.0	0.0	3.7	3.7	7.8	
4 NAUSEA	18.5	10.5	22.2	18.5	11.1	18.5	14.8	3.7	18.5	11.1	15.6	
5 UNCONTROLLABLE SNEEZING	7.4	11.1	7.4	11.1	3.7	11.1	14.8	3.7	14.8	7.4	9.3	
6 SWALLOWS FREQUENTLY TO AVOID VOMITING	51.9	14.8	14.8	51.9	14.8	18.5	14.8	14.8	11.1	7.4	21.5	
7 VOMITED ONCE OR THICE; MAY AGAIN	51.9	33.3	40.7	51.9	33.3	37.0	40.7	25.9	40.7	33.3	38.9	
8 VOMITED SEVERAL TIMES; DRY HEAVES	63.0	51.9	63.0	59.3	55.6	40.7	48.1	40.7	59.3	48.1	53.0	
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	29.6	22.2	22.2	25.9	22.2	25.9	22.2	22.2	37.0	25.9	25.6	
10 OCCASIONAL DIARRHEA; FREQUENTLY DIARRHEA	29.6	18.5	22.2	29.6	18.5	22.2	22.2	33.3	40.7	37.0	27.4	
11 FREQUENT DIARRHEA AND CRAMPS	59.3	44.4	59.3	55.6	48.1	51.9	44.4	40.7	55.6	40.7	50.0	
12 UNCOMFORTABLE DIAPHRAGMATIC PAINFUL CRAMPS	66.7	55.6	59.3	66.7	48.1	48.1	48.1	55.6	51.9	44.4	54.4	
13 SOMEWHAT TIRED WITH A MILD WEAKNESS	3.7	7.4	7.4	0.0	7.4	0.0	3.7	11.1	18.5	11.1	7.0	
14 TIRED WITH MODERATE WEAKNESS	0.0	3.7	7.4	3.7	3.7	3.7	3.7	7.4	18.5	3.7	5.6	
15 VERY TIRED AND WEAK	14.8	11.1	14.8	14.8	18.5	14.8	11.1	11.1	44.4	18.5	17.4	
16 EXHAUSTED WITH ALMOST NO STRENGTH	40.7	44.4	51.9	48.1	44.4	40.7	40.7	51.9	70.4	40.7	47.4	
17 SLIGHTLY LIGHTHEADED	11.1	7.4	7.4	14.8	18.5	11.1	14.8	22.2	22.2	11.1	14.1	
18 UNSTeady UPON STANDING QUICKLY	18.5	18.5	29.6	25.9	29.6	29.6	25.9	29.6	33.3	22.2	26.3	
19 FAINT UPON STANDING QUICKLY	40.7	33.3	37.0	44.4	37.0	33.3	29.6	37.0	55.6	29.6	37.8	
20 MILD EYES AND HEADACHE	22.2	14.8	14.8	18.5	11.1	11.1	18.5	7.4	14.8	18.5	15.2	
21 JOINTS ACHE	3.7	11.1	14.8	0.0	3.7	11.1	11.1	18.5	37.0	18.5	13.0	
22 UNCONTROLLABLE SWEATING	7.4	3.7	7.4	11.1	7.4	3.7	11.1	0.0	0.0	14.8	6.7	
23 MODERATE FEVER	3.7	7.4	3.7	3.7	7.4	3.7	3.7	7.4	3.7	0.0	4.4	
24 DOESN'T WANT TO EAT	0.0	0.0	3.7	3.7	3.7	3.7	7.4	0.0	0.0	7.4	3.3	
25 SPOES IN MOUTH/THROAT	51.9	18.5	14.8	44.4	14.8	11.1	11.1	11.1	7.4	11.1	19.6	
26 SHAKES AND CHILLS	18.5	25.9	22.2	25.9	25.9	22.2	25.9	18.5	25.9	11.1	22.2	
27 ACNE ALL OVER	11.1	11.1	14.8	11.1	11.1	11.1	11.1	11.1	22.2	14.8	13.3	
28 DIFFICULTY IN STOPPING BLEEDING	59.3	59.3	63.0	55.6	51.9	55.6	55.6	51.9	66.7	51.9	57.0	
29 THIRSTY AND HAS DRY MOUTH	22.2	3.7	3.7	22.2	0.0	3.7	0.0	3.7	3.7	3.7	6.7	
30 WEAK AND FAINT	18.5	11.1	14.8	22.2	14.8	11.1	11.1	11.1	22.2	14.8	15.2	
31 VERY DRY MOUTH AND THROAT	18.5	7.4	7.4	18.5	0.0	0.0	0.0	0.0	7.4	7.4	7.0	
32 HEADACHE	14.8	14.8	14.8	18.5	14.8	18.5	14.8	14.8	18.5	11.1	15.6	
33 RAPID HEARTBEAT	11.1	7.4	7.4	11.1	11.1	7.4	7.4	14.8	14.8	14.8	10.7	
34 MAY FAINT WITH MODERATE EXERTION	33.3	33.3	40.7	33.3	33.3	40.7	33.3	37.0	48.1	44.4	37.8	
35 EXHAUSTED; DRY MOUTH, IRRITATED SKIN	18.5	7.4	14.8	22.2	11.1	3.7	11.1	7.4	11.1	3.7	11.1	
36 VERY PAINFUL HEADACHE	44.4	33.3	44.4	40.7	48.1	44.4	44.4	44.4	48.1	44.4	43.7	
37 DIFFICULTY MOVING	25.9	22.2	25.9	29.6	18.5	22.2	22.2	25.9	29.6	25.9	24.8	
38 SHORT OF BREATH	29.6	18.5	25.9	25.9	18.5	22.2	14.8	14.8	25.9	18.5	21.5	
39 RUPPING SKIN AND LIPS	37.0	55.6	48.1	48.1	55.6	55.6	48.1	48.1	40.7	33.3	47.0	
Average	25.2	20.2	23.1	26.4	20.4	20.1	20.2	19.8	27.4	20.1	22.4	

Table C.5. Percent of responses in serious category for military tasks on TOW crew revisit questionnaire (40 respondents).

Symptom Description	Task Number										
	1	2	3	4	5	6	7	8	9	10	11
1 UPSET STOMACH	10.0	7.5	5.0	10.0	2.5	12.5	2.5	0.0	0.0	0.0	5.0
2 CLAMMY AND SWEATY	7.5	5.0	2.5	7.5	5.0	12.5	12.5	7.5	10.0	5.0	5.0
3 MOUTH WATER, SMALL TONGUE FLOQUENTLY	5.0	7.5	2.5	2.5	0.0	0.0	5.0	2.5	2.5	0.0	2.5
4 NAUSEATED	30.0	17.5	7.5	15.0	5.0	20.0	25.0	10.0	12.5	2.5	20.0
5 UNCONTROLLABLE SNEEZING	12.5	10.0	0.0	12.5	12.5	15.0	20.0	12.5	17.5	10.0	12.5
6 SMALL TONGUE FLOQUENTLY TO AVOID VOMITING	12.5	12.5	10.0	5.0	0.0	12.5	17.5	5.0	7.5	0.0	7.5
7 VOMITED ONCE UP TWICE, MAY AGAIN	32.5	25.0	12.5	25.0	27.5	37.5	37.5	27.5	25.0	15.0	27.5
8 VOMITED SEVERAL TIMES, DRY HEAVES	62.5	50.0	42.5	37.5	35.0	45.0	57.5	45.0	35.0	22.5	42.5
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	32.5	20.0	15.0	20.0	20.0	27.5	40.0	30.0	27.5	15.0	22.5
10 OCCASIONAL DIARRHEA, FREQUENTLY DEFECATED	75.0	20.0	20.0	22.5	22.5	22.5	27.5	20.0	20.0	20.0	17.5
11 FREQUENT DIARRHEA AND CRAMPS	50.0	50.0	30.0	35.0	32.5	47.5	52.5	42.5	42.5	25.0	32.5
12 UNCONTROLLABLE DIARRHEA, PAINFUL CRAMPS	90.0	70.0	57.5	65.0	62.5	70.0	70.0	65.0	65.0	55.0	70.0
13 SOMEWHAT TIRED WITH A MILD WEAKNESS	2.5	0.0	2.5	7.5	2.5	7.5	5.0	5.0	7.5	2.5	10.0
14 TIRED WITH MODERATE WEAKNESS	6.0	5.0	5.0	10.0	5.0	12.5	10.0	2.5	7.5	5.0	15.0
15 VERY TIRED AND WEAK	27.5	12.5	10.0	22.5	17.5	25.0	30.0	20.0	27.5	12.5	25.0
16 EXHAUSTED WITH ALMOST NO STRENGTH	62.5	50.0	37.5	40.0	45.0	52.5	52.5	45.0	50.0	37.5	45.0
17 SLIGHTLY LIGHTHEADED	20.0	12.5	5.0	10.0	5.0	7.5	22.5	15.0	17.5	5.0	12.5
18 UNSTEADY UPON STANDING QUICKLY	35.0	25.0	22.5	25.0	17.5	22.5	17.5	12.5	15.0	10.0	12.5
19 FAINTS UPON STANDING QUICKLY	52.5	42.5	37.5	40.0	37.5	47.5	37.5	30.0	32.5	25.0	32.5
20 MILD EYES AND HEADACHE	12.5	7.5	7.5	5.0	7.5	15.0	15.0	7.5	12.5	5.0	12.5
21 JOINTS ACID	17.5	15.0	7.5	17.5	20.0	27.5	30.0	22.5	10.0	15.0	20.0
22 UNCONTROLLABLE SWEATING	7.5	7.5	2.5	5.0	7.5	12.5	22.5	12.5	12.5	7.5	15.0
23 MODERATE FEVER	5.0	2.5	0.0	0.0	0.0	0.0	5.0	5.0	2.5	2.5	5.0
24 DON'T WANT TO EAT	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5
25 SUPERS IN MOUTH/THROAT	20.0	22.5	35.0	12.5	10.0	10.0	12.5	10.0	10.0	10.0	10.0
26 SHAKES AND CHILLS	52.5	45.0	30.0	40.0	42.5	45.0	60.0	35.0	35.0	27.5	37.5
27 AGES ALL OVER	27.5	20.0	12.5	27.5	30.0	32.5	37.5	30.0	27.5	22.5	22.5
28 DIFFICULTY IN STOPPING BLEEDING	57.5	57.5	45.0	45.0	50.0	47.5	50.0	47.5	50.0	45.0	40.0
29 THIRSTY AND HAS DRY MOUTH	2.5	2.5	5.0	0.0	0.0	2.5	2.5	0.0	0.0	0.0	0.0
30 WEAK AND FAINT	55.0	42.5	27.5	35.0	37.5	37.5	50.0	50.0	50.0	30.0	40.0
31 VERY DRY MOUTH AND THROAT	7.5	10.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32 HEADACHE	22.5	12.5	10.0	5.0	5.0	7.5	25.0	10.0	12.5	7.5	10.0
33 RAPID HEARTBEAT	30.0	22.5	15.0	20.0	20.0	20.0	40.0	30.0	27.5	22.5	20.0
34 MAY FAINT WITH MODERATE EXERTION	37.5	30.0	32.5	32.5	27.5	35.0	30.0	25.0	25.0	22.5	22.5
35 EXTREMELY DRY MOUTH, THROAT, SKIN	12.5	7.5	12.5	0.0	0.0	0.0	5.0	2.5	2.5	2.5	2.5
36 VERY PAINFUL HEADACHE	60.0	55.0	42.5	42.5	40.0	42.5	65.0	50.0	55.0	40.0	45.0
37 DIFFICULTY MOVING	37.5	32.5	25.0	35.0	40.0	42.5	37.5	35.0	32.5	35.0	30.0
38 SHORT OF BREATH	75.0	70.0	52.5	62.5	70.0	72.5	82.5	72.5	82.5	72.5	70.0
39 RUPPING SKIN AND EYES	77.5	70.0	52.5	62.5	70.0	72.5	82.5	72.5	82.5	72.5	70.0
Average	29.9	24.2	18.5	21.1	20.1	25.3	29.6	22.5	23.1	16.3	21.7

Table C.5. Continued.

Symptom Description	Task Number											Mean	
	12	13	14	15	16	17	18	18	18	18	18	Percent	Percent
1 UPGAY TINGING	5.0	17.5	0.0	5.0	0.0	20.0	15.0	15.0	15.0	15.0	15.0	6.5	6.5
2 CLAMMY AND SWEATY	12.5	30.0	2.5	7.5	5.0	20.0	15.0	15.0	15.0	15.0	15.0	9.6	9.6
3 MOUTH WATER-SWALLOW-FREQUENTLY	5.0	20.0	0.0	0.0	0.0	5.0	5.0	5.0	5.0	5.0	5.0	3.6	3.6
4 NAUSEATION	20.0	42.5	7.5	15.0	5.0	32.5	17.5	17.5	17.5	17.5	17.5	16.9	16.9
5 CONSIDERABLE SWEATING	15.0	37.5	2.5	5.0	5.0	27.5	10.0	10.0	10.0	10.0	10.0	13.2	13.2
6 SWALLOW-FREQUENTLY TO AVOID VOMITING	7.5	40.0	7.5	7.5	0.0	17.5	15.0	15.0	15.0	15.0	15.0	10.3	10.3
7 VOMITED ONCE OR TWICE; MAY AGAIN	20.0	40.0	15.0	17.5	15.0	37.5	30.0	30.0	30.0	30.0	30.0	26.0	26.0
8 VOMITED SEVERAL TIMES; DRY HEAVES	32.5	65.0	32.5	25.0	25.0	67.5	65.0	65.0	65.0	65.0	65.0	43.8	43.8
9 FEELS UNCOMFORTABLE; URGE TO DEFECATE	22.5	45.0	22.5	20.0	20.0	45.0	45.0	45.0	45.0	45.0	45.0	27.2	27.2
10 OCCASIONAL DIARRHEA; RECENTLY DEFECATED	20.0	37.5	25.0	20.0	20.0	40.0	32.5	32.5	32.5	32.5	32.5	24.0	24.0
11 FREQUENT DIARRHEA AND CRAMPS	42.5	65.0	42.5	35.0	32.5	60.0	52.5	52.5	52.5	52.5	52.5	43.1	43.1
12 UNCONTROLLABLE DIARRHEA; PAINFUL CRAMPS	67.5	87.5	70.0	67.5	60.0	87.5	85.0	85.0	85.0	85.0	85.0	79.3	79.3
13 SOMEWHAT TIRED WITH A MILD WEAKNESS	5.0	15.0	0.0	5.0	5.0	25.0	25.0	25.0	25.0	25.0	25.0	7.4	7.4
14 TIRED WITH MODERATE WEAKNESS	10.0	30.0	7.5	10.0	5.0	42.5	40.0	40.0	40.0	40.0	40.0	12.6	12.6
15 VERY TIRED AND WEAK	20.0	52.5	27.5	25.0	27.5	72.5	70.0	70.0	70.0	70.0	70.0	29.2	29.2
16 EXHAUSTED WITH ALMOST NO STRENGTH	42.5	67.5	57.5	50.0	50.0	77.5	77.5	77.5	77.5	77.5	77.5	52.2	52.2
17 SLIGHTLY LIGHTHEADED	22.5	50.0	7.5	7.5	7.5	32.5	35.0	35.0	35.0	35.0	35.0	16.4	16.4
18 UNSTEADY UPON STANDING QUICKLY	15.0	30.0	20.0	15.0	15.0	67.5	55.0	55.0	55.0	55.0	55.0	24.0	24.0
19 FAINTS UPON STANDING QUICKLY	30.0	42.5	37.5	25.0	25.0	77.5	70.0	70.0	70.0	70.0	70.0	40.1	40.1
20 MILD FEVER AND HEADACHE	7.5	25.0	2.5	5.0	5.0	12.5	10.0	10.0	10.0	10.0	10.0	9.7	9.7
21 JOINTS ACHES	17.5	32.5	20.0	25.0	22.5	50.0	42.5	42.5	42.5	42.5	42.5	22.9	22.9
22 CONSIDERABLE SWEATING	10.0	30.0	0.0	5.0	0.0	22.5	15.0	15.0	15.0	15.0	15.0	10.8	10.8
23 MODERATE PFAVE	7.5	7.5	2.5	7.5	2.5	12.5	2.5	2.5	2.5	2.5	2.5	3.9	3.9
24 ONE SHIRT WANTS IN FAT	2.5	6.0	0.0	2.5	0.0	10.0	5.0	5.0	5.0	5.0	5.0	1.9	1.9
25 SWEAT IN MODERATE	12.5	12.5	5.0	5.0	5.0	7.5	5.0	5.0	5.0	5.0	5.0	11.9	11.9
26 SHAKES AND CHILLS	40.0	70.0	27.5	30.0	25.0	52.5	50.0	50.0	50.0	50.0	50.0	41.7	41.7
27 ACHES ALL OVER	32.5	47.5	20.0	25.0	22.5	55.0	52.5	52.5	52.5	52.5	52.5	30.3	30.3
28 DIFFICULTY IN STOPPING BLEEDING	40.0	50.0	42.5	42.5	37.5	62.5	57.5	57.5	57.5	57.5	57.5	48.2	48.2
29 THIRSTY AND HAS DRY MOUTH	0.0	5.0	5.0	10.0	5.0	12.5	7.5	7.5	7.5	7.5	7.5	3.3	3.3
30 WEAK AND PAINT	45.0	70.0	42.5	35.0	32.5	70.0	62.5	62.5	62.5	62.5	62.5	45.1	45.1
31 VERY DRY MOUTH AND THROAT	2.5	2.5	0.0	2.5	0.0	7.5	5.0	5.0	5.0	5.0	5.0	2.5	2.5
32 HEADACHE	17.5	30.0	0.0	2.5	2.5	22.5	17.5	17.5	17.5	17.5	17.5	12.8	12.8
33 EARLO HEADACHE	25.0	47.5	15.0	25.0	12.5	47.5	40.0	40.0	40.0	40.0	40.0	26.7	26.7
34 MAY FAINT WITH MODERATE EXERTION	27.5	42.5	35.0	35.0	37.5	70.0	65.0	65.0	65.0	65.0	65.0	35.1	35.1
35 EXTREMELY DRY MOUTH, THROAT, SKIN	2.5	12.5	5.0	5.0	5.0	15.0	12.5	12.5	12.5	12.5	12.5	5.8	5.8
36 VERY PAINFUL MOVING	40.0	22.5	30.0	32.5	30.0	60.0	62.5	62.5	62.5	62.5	62.5	48.1	48.1
37 DIFFICULTY MOVING	30.0	52.5	35.0	37.5	37.5	70.0	62.5	62.5	62.5	62.5	62.5	39.9	39.9
38 SHORT OF BREATH	30.0	57.5	17.5	20.0	17.5	67.5	62.5	62.5	62.5	62.5	62.5	32.4	32.4
39 BURNING SKIN AND EYES	57.5	90.0	57.5	62.5	52.5	75.0	77.5	77.5	77.5	77.5	77.5	68.8	68.8
Average	22.1	40.4	19.2	19.9	17.3	42.5	37.8	37.8	37.8	37.8	37.8	25.1	25.1

Table C.6. Percent of responses in negligible effect category for military tasks on artillery gun crew revisit questionnaire (6 respondents).

Symptom Description	Task Number											Mean
	1	2	3	4	5	6	7	8	9	10	11	Percent
1 UPSET STOMACH	33.3	50.0	33.3	33.3	50.0	0.0	16.7	0.0	16.7	16.7	0.0	22.7
2 CLAMMY AND SWEATY	66.7	50.0	33.3	50.0	33.3	16.7	16.7	16.7	33.3	50.0	33.3	36.4
3 MOUTH WATER; SWALLOWS FREQUENTLY	50.0	66.7	33.3	33.3	33.3	16.7	33.3	33.3	50.0	50.0	33.3	39.4
4 HAUNSEATED	16.7	33.3	16.7	33.3	16.7	0.0	0.0	16.7	0.0	33.3	0.0	15.2
5 CONSIDERABLE SWEATING	50.0	50.0	33.3	33.3	33.3	16.7	16.7	50.0	33.3	33.3	33.3	34.8
6 SWALLOWS FREQUENTLY TO AVOID VOMITING	16.7	33.3	16.7	16.7	16.7	0.0	0.0	16.7	50.0	33.3	16.7	19.7
7 VOMITED ONCE UP TWICE; MAY AGAIN	0.0	16.7	33.3	0.0	0.0	0.0	0.0	16.7	0.0	16.7	0.0	7.6
8 RUMBLED SEVERAL TIMES; DRY HEAVES	0.0	16.7	16.7	16.7	0.0	0.0	16.7	16.7	33.3	16.7	16.7	13.6
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	66.7	50.0	16.7	33.3	33.3	33.3	16.7	16.7	50.0	33.3	33.3	34.8
10 OCCASIONAL DIARRHEA; RECENTLY DEFECATED	50.0	50.0	33.3	33.3	33.3	16.7	16.7	33.3	33.3	33.3	33.3	33.3
11 EXCESSIVE DIARRHEA AND CRAMPS	16.7	16.7	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5
12 UNCOMFORTABLE DIARRHEA; PAINFUL CRAMPS	16.7	16.7	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0	4.5
13 SOMETIMES TIRED WITH A MILD WEARINESS	50.0	50.0	0.0	0.0	16.7	16.7	16.7	16.7	16.7	33.3	16.7	21.2
14 TIRED WITH MODERATE WEARINESS	33.3	16.7	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	6.1
15 VERT TIRED AND WEAK	50.0	33.3	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1
16 EXHAUSTED WITH ALMOST NO STRENGTH	16.7	16.7	0.0	0.0	16.7	0.0	0.0	0.0	0.0	33.3	0.0	7.6
17 SLIGHTLY LIGHTHEADED	50.0	33.3	66.7	33.3	50.0	33.3	16.7	33.3	16.7	16.7	50.0	36.4
18 UNSTEADY UPON STANDING QUICKLY	83.3	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	9.1
19 FAINTS UPON STANDING QUICKLY	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1
20 BILD EYES AND HEADACHE	83.3	33.3	33.3	33.3	33.3	33.3	16.7	33.3	50.0	33.3	33.3	37.9
21 JOINTS ACHES	83.3	0.0	0.0	0.0	0.0	16.7	0.0	16.7	33.3	0.0	16.7	15.2
22 CONSIDERABLE SWEATING	66.7	16.7	16.7	16.7	16.7	33.3	16.7	50.0	33.3	33.3	33.3	30.3
23 MODERATE SWEAT	66.7	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	7.6
24 DUSKING WART IN FAT	83.3	33.3	16.7	16.7	16.7	33.3	16.7	16.7	16.7	33.3	16.7	27.3
25 SORES IN MOUTH/THROAT	33.3	16.7	0.0	0.0	16.7	33.3	0.0	0.0	0.0	16.7	0.0	10.6
26 SHAKES AND CHILLS	33.3	16.7	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	6.1
27 ACHE'S ALL OVER	66.7	16.7	0.0	0.0	0.0	16.7	0.0	0.0	0.0	16.7	0.0	10.6
28 DIFFICULTY IN STOPPING BLEEDING	50.0	0.0	16.7	0.0	16.7	16.7	0.0	0.0	16.7	0.0	16.7	12.1
29 THIRSTY AND HAS DRY MOUTH	16.7	16.7	16.7	0.0	16.7	33.3	0.0	16.7	16.7	0.0	16.7	13.6
30 WEAK AND FAINT	50.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6
31 VERY DRY MOUTH AND THROAT	16.7	16.7	0.0	0.0	0.0	33.3	16.7	16.7	0.0	0.0	16.7	10.6
32 HEADACHE	50.0	16.7	16.7	16.7	0.0	33.3	33.3	16.7	0.0	16.7	0.0	18.2
33 PAIN HEAVY	66.7	33.3	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	22.7
34 MAY FAINT WITH MODERATE EFFORT	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5
35 EXTREMELY DRY MOUTH, THROAT, SKIN	16.7	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	16.7	6.1
36 VERY PAINFUL HEADACHE	16.7	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5
37 DIFFICULTY MOVING	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	7.6
38 SHORT OF BREATH	16.7	16.7	16.7	0.0	0.0	0.0	0.0	0.0	0.0	16.7	16.7	7.6
39 BURNING SKIN AND EYES	50.0	0.0	0.0	0.0	0.0	16.7	16.7	16.7	16.7	16.7	33.3	15.2
Average	54.0	22.6	12.8	11.1	12.4	12.8	7.7	12.4	14.5	16.7	12.8	16.4

Table C.7. Percent of responses in negligible effect category for military tasks on EDC revisit questionnaire (10 respondents).

Symptom Description	Task Number								Mean Percent
	1	2	3	4	5	6	7	8	
1 UPSET STOMACH	70.0	40.0	60.0	40.0	60.0	50.0	40.0	50.0	51.3
2 CLAMMY AND SWEATY	50.0	30.0	40.0	30.0	40.0	30.0	30.0	40.0	38.8
3 MOUTH WATERS; SWALLOWS FREQUENTLY	30.0	30.0	20.0	50.0	70.0	20.0	40.0	20.0	35.0
4 HANGRY	20.0	0.0	20.0	10.0	60.0	20.0	10.0	30.0	21.3
5 CONSIDERABLE SWEATING	40.0	20.0	40.0	30.0	30.0	30.0	20.0	40.0	32.5
6 SWALLOWS FREQUENTLY TO AVOID VOMITING	20.0	10.0	10.0	30.0	80.0	20.0	10.0	20.0	25.0
7 VOMITED ONCE OR TWICE; MAY AGAIN	20.0	0.0	10.0	10.0	70.0	10.0	0.0	20.0	17.5
8 VOMITED SEVERAL TIMES; DRY HEAVES	20.0	10.0	10.0	10.0	60.0	10.0	0.0	20.0	17.5
9 FEELS UNCOMFORTABLE UNCE TO DEFECCATE	40.0	30.0	30.0	20.0	80.0	20.0	20.0	30.0	33.8
10 OCCASIONAL DIARRHEA; RECENTLY DEFECCATED	30.0	20.0	30.0	20.0	60.0	20.0	20.0	30.0	28.8
11 FREQUENT DIARRHEA AND CRAMPS	20.0	20.0	30.0	20.0	60.0	20.0	20.0	30.0	22.5
12 UNCONTROLLABLE DIARRHEA; PAINFUL CRAMPS	20.0	10.0	20.0	0.0	30.0	0.0	0.0	20.0	12.5
13 SOMEWHAT TIRED WITH A MILD WEAKNESS	50.0	30.0	30.0	30.0	70.0	30.0	20.0	40.0	37.5
14 TIRED WITH MODERATE WEAKNESS	50.0	10.0	20.0	20.0	80.0	30.0	20.0	30.0	36.3
15 VERY TIRED AND WEAK	20.0	10.0	10.0	10.0	70.0	10.0	10.0	20.0	20.0
16 EXHAUSTED WITH ALMOST NO STRENGTH	20.0	10.0	10.0	10.0	60.0	10.0	10.0	20.0	18.8
17 SLIGHTLY LIMEHEAD	40.0	20.0	30.0	20.0	70.0	20.0	20.0	30.0	31.3
18 UNSTEADY UPON STANDING QUICKLY	20.0	20.0	10.0	10.0	40.0	10.0	10.0	20.0	17.5
19 FAINTS UPON STANDING QUICKLY	20.0	10.0	10.0	10.0	50.0	10.0	20.0	20.0	18.8
20 MILD FEVER AND HEADACHE	30.0	20.0	20.0	20.0	80.0	20.0	10.0	20.0	27.5
21 JOINTS ACHES	30.0	10.0	20.0	10.0	50.0	20.0	10.0	20.0	21.3
22 CONSIDERABLE SWEATING	40.0	20.0	30.0	10.0	50.0	20.0	20.0	20.0	26.3
23 REDDISH FEVER	30.0	10.0	20.0	10.0	60.0	10.0	0.0	20.0	20.0
24 DOESN'T WANT TO EAT	30.0	20.0	30.0	10.0	50.0	20.0	20.0	20.0	25.0
25 SORES IN MOUTH/THROAT	10.0	10.0	0.0	20.0	50.0	10.0	10.0	10.0	15.0
26 SHAKES AND CHILLS	30.0	20.0	20.0	10.0	60.0	20.0	10.0	20.0	23.8
27 ACHES ALL OVER	30.0	10.0	20.0	10.0	40.0	10.0	10.0	20.0	18.8
28 DIFFICULTY IN STOPPING BLEEDING	30.0	10.0	10.0	10.0	30.0	20.0	10.0	20.0	17.5
29 THIRSTY AND HAS DRY MOUTH	20.0	20.0	10.0	20.0	50.0	10.0	30.0	10.0	21.3
30 WEAK AND FAINT	30.0	10.0	10.0	10.0	60.0	10.0	10.0	20.0	20.0
31 VERY DRY MOUTH AND THROAT	20.0	20.0	20.0	20.0	50.0	10.0	20.0	10.0	21.3
32 HEADACHE	10.0	0.0	0.0	0.0	40.0	0.0	0.0	10.0	7.5
33 RAPID HEARTBEAT	20.0	10.0	10.0	10.0	50.0	20.0	10.0	20.0	18.8
34 MAY FAINT WITH MODERATE EXERCISE	20.0	10.0	10.0	10.0	50.0	10.0	10.0	20.0	17.5
35 EXTREMELY DRY MOUTH, THROAT, SKIN	10.0	10.0	0.0	20.0	40.0	10.0	30.0	20.0	17.5
36 VERY PAINFUL HEADACHE	10.0	0.0	0.0	0.0	40.0	0.0	0.0	10.0	7.5
37 DIFFICULTY MOVING	30.0	10.0	20.0	10.0	40.0	40.0	10.0	40.0	25.0
38 SHORT OF BREATH	20.0	10.0	10.0	20.0	50.0	20.0	20.0	20.0	21.3
39 BURNING SKIN AND EYES	10.0	0.0	10.0	0.0	10.0	0.0	0.0	20.0	6.3
Average	27.2	14.9	18.5	15.6	55.4	16.7	14.4	23.1	23.2

Table C.8. Percent of responses in negligible effect category for military tasks on tank crew revisit questionnaire (27 respondents).

Symptom Description	Task Number										Mean
	1	2	3	4	5	6	7	8	9	10	Percent
1 UPSET STOMACH	59.3	59.3	66.7	63.0	59.3	66.7	59.3	70.4	55.6	51.9	61.1
2 CLARITY AND SWEAT	41.0	48.1	55.6	55.6	54.3	55.6	51.9	55.6	55.6	51.9	55.2
3 MOUTH WATER; SWALLOWS FREQUENTLY	40.7	59.3	59.3	40.7	59.3	63.0	59.3	59.3	55.6	51.9	55.2
4 NAUSEATED	44.4	51.9	48.1	44.4	51.9	48.1	48.1	59.3	40.7	51.9	48.9
5 TIPS/SLURRY/SHALL SWEATING	51.9	48.1	51.9	55.6	51.9	44.4	44.4	51.9	44.4	44.4	48.9
6 SWALLOWS FREQUENTLY TO AVOID VOMITING	14.8	40.7	51.9	22.2	51.9	37.0	44.4	48.1	40.7	48.1	40.0
7 VOMITED MORE THAN TWICE; MAY AGAIN	14.8	25.9	22.2	14.8	22.2	22.2	22.2	33.3	14.8	29.6	22.2
8 VOMITED SEVERAL TIMES; DRY HEAVES	18.5	18.5	14.8	14.8	14.8	11.1	14.8	18.5	11.1	11.1	14.8
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	33.3	33.3	33.3	33.3	29.6	25.9	33.3	29.6	22.2	25.9	30.0
10 OCCASIONAL DIARRHEA; FREQUENTLY DEFECATED	44.4	48.1	48.1	33.3	40.7	37.0	40.7	25.9	18.5	22.2	35.9
11 FREQUENT DIARRHEA AND CRAMPS	14.8	22.2	11.1	18.5	18.5	14.8	25.9	22.2	14.8	22.2	18.5
12 UNCOMFORTABLE STOMACH PAINFUL CRAMPS	11.1	14.8	14.8	7.4	14.8	22.2	18.5	18.5	14.8	11.1	14.8
13 SOMEWHAT TIRED WITH A MILD WEARINESS	44.4	44.4	44.4	48.1	51.9	48.1	44.4	44.4	44.4	37.0	45.2
14 TIRED WITH MODERATE WEARINESS	37.0	40.7	37.0	37.0	40.7	40.7	40.7	37.0	33.3	33.3	37.8
15 VERY TIRED AND WEAK	29.6	33.3	33.3	25.9	29.6	29.6	29.6	29.6	14.8	29.6	28.5
16 EXHAUSTED WITH ALMOST NO STRENGTH	14.8	18.5	18.5	18.5	14.8	14.8	18.5	14.8	7.4	18.5	15.9
17 SLIGHTLY LUNGAID	40.7	44.4	44.4	29.6	33.3	40.7	37.0	29.6	29.6	33.3	36.3
18 UNSTEADY UPON STANDING QUICKLY	22.2	29.6	29.6	18.5	22.2	29.6	25.9	22.2	11.1	25.9	23.7
19 FAINTS UPON STANDING QUICKLY	29.6	33.3	25.9	18.5	22.2	22.2	25.9	22.2	7.4	22.2	23.0
20 MILD FEVER AND HEADACHE	40.7	37.0	40.7	40.7	40.7	48.1	40.7	40.7	40.7	33.3	40.4
21 JOINTS ACHE	37.0	33.3	40.7	40.7	44.4	37.0	40.7	33.3	22.2	33.3	36.3
22 CONSIDERABLE SWEATING	33.3	33.3	40.7	37.0	37.0	40.7	33.3	40.7	37.0	29.6	36.3
23 MODERATE SWEAT	37.0	37.0	37.0	37.0	37.0	33.3	33.3	40.7	33.3	37.0	36.7
24 OUTFIGHT WANT TO EAT	37.0	37.0	37.0	37.0	37.0	40.7	33.3	40.7	40.7	33.3	37.4
25 SLEEP IN MOUTH/THROAT	14.8	29.6	33.3	18.5	29.6	22.2	22.2	29.6	29.6	29.6	25.9
26 SHAKES AND CHILLS	25.9	22.2	22.2	25.9	25.9	25.9	25.9	22.2	18.5	22.2	23.7
27 ACHE ALL OVER	75.9	22.2	29.6	75.9	22.2	22.2	25.9	22.2	18.5	22.2	23.7
28 DIFFICULTY IN STOPPING BLEEDING	11.1	14.8	11.1	18.5	14.8	11.1	14.8	18.5	11.1	11.1	13.7
29 INTENSITY AND DRY MOUTH	18.5	33.3	37.0	25.9	33.3	33.3	33.3	33.3	29.6	29.6	30.7
30 WEAK AND FAINT	25.9	29.6	22.2	25.9	29.6	25.9	25.9	25.9	18.5	18.5	24.8
31 VERY DRY MOUTH AND THROAT	22.2	33.3	33.3	25.9	37.0	37.0	37.0	33.3	29.6	29.6	31.9
32 HEADACHE	29.6	29.6	29.6	25.9	24.6	33.3	24.6	33.3	25.9	25.9	29.3
33 RAPID HEARTBEAT	33.3	29.6	37.0	33.3	33.3	33.3	37.0	25.9	25.9	22.2	31.1
34 MAY FAINT WITH MODERATE EXERCISE	22.2	22.2	25.9	29.6	25.9	22.2	18.5	18.5	14.8	14.8	21.5
35 EXTREMELY DRY MOUTH/THROAT/SKIN	29.6	33.3	33.3	33.3	33.3	33.3	33.3	33.3	29.6	33.3	32.6
36 VERY PAINFUL HEADACHE	22.2	25.9	22.2	29.6	18.5	18.5	14.8	22.2	18.5	22.2	21.5
37 DIFFICULTY MOVING	18.5	18.5	22.2	18.5	14.8	14.8	14.8	18.5	11.1	16.7	16.7
38 SHORT OF BREATH	18.5	22.2	22.2	18.5	25.9	25.9	18.5	25.9	18.5	22.2	21.9
39 RUPTING SKIN AND EYES	22.2	11.1	18.5	18.5	18.5	7.4	11.1	18.5	11.1	22.2	15.9
Average	29.6	32.6	33.5	29.9	32.9	31.7	31.6	32.5	26.4	29.0	31.0

Table C.9. Percent of responses in negligible effect category for military tasks on
TOW crew revisit questionnaire (40 respondents).

Symptom Description	Task Number										
	1	2	3	4	5	6	7	8	9	10	11
1 UPSET STOMACH	55.0	52.5	45.0	45.0	52.5	45.0	47.5	45.0	45.0	45.0	42.5
2 CLAMMY AND SWEATY	55.0	50.0	47.5	47.5	40.0	37.5	37.5	37.5	35.0	37.5	40.0
3 MOUTH WATER; SWALLOWS FREQUENTLY	60.0	45.0	50.0	50.0	52.5	50.0	45.0	42.5	42.5	47.5	40.0
4 NAUSEATED	42.5	32.5	35.0	32.5	35.0	30.0	27.5	30.0	32.5	37.5	25.0
5 CONSIDERABLE SWELLING	47.5	37.5	45.0	32.5	35.0	30.0	32.5	32.5	32.5	32.5	32.5
6 SWALLOW FREQUENTLY TO AVOID VOMITING	50.0	42.5	40.0	37.5	42.5	40.0	30.0	35.0	32.5	40.0	35.0
7 VOMITED ONCE OR TWICE; MAY AGAIN	27.5	22.5	32.5	22.5	22.5	22.5	20.0	25.0	25.0	35.0	25.0
8 VOMITED SEVERAL TIMES; URGENT NEED	20.0	20.0	30.0	25.0	27.5	22.5	20.0	22.5	27.5	35.0	25.0
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	30.0	30.0	35.0	30.0	30.0	25.0	17.5	17.5	20.0	30.0	20.0
10 OCCASIONAL DIARRHEA; RECENTLY DEFECATED	10.0	22.5	27.5	25.0	27.5	27.5	22.5	25.0	22.5	27.5	22.5
11 FREQUENT DIARRHEA AND CRAMPS	20.0	12.5	20.0	20.0	25.0	12.5	15.0	10.0	17.5	27.5	17.5
12 UNCONTROLLABLE DIARRHEA; PAINFUL CRAMPS	5.0	5.0	12.5	7.5	10.0	5.0	5.0	5.0	5.0	15.0	5.0
13 SOMEWHAT TIRED WITH A MILD WEARINESS	57.5	50.0	47.5	47.5	52.5	47.5	42.5	45.0	42.5	50.0	40.0
14 TIRED WITH MODERATE WEARINESS	47.5	42.5	37.5	32.5	35.0	30.0	32.5	32.5	32.5	37.5	25.0
15 VERY TIRED AND WEAK	37.5	35.0	35.0	30.0	32.5	27.5	27.5	30.0	27.5	37.5	25.0
16 EXHAUSTED WITH ALMOST NO STRENGTH	22.5	22.5	25.0	17.5	20.0	20.0	17.5	15.0	17.5	27.5	17.5
17 SLIGHTLY LIGHTHEADED	45.0	35.0	37.5	42.5	35.0	35.0	27.5	27.5	27.5	35.0	22.5
18 UNSTEADY UPON STANDING QUICKLY	35.0	27.5	27.5	25.0	25.0	25.0	27.5	25.0	27.5	30.0	25.0
19 FAINTS UPON STANDING QUICKLY	20.0	20.0	17.5	15.0	15.0	15.0	17.5	15.0	17.5	25.0	17.5
20 BILLO-EYES AND HEADACHE	45.0	37.5	37.5	35.0	35.0	37.5	35.0	37.5	35.0	40.0	32.5
21 JOINTS ACHE	45.0	42.5	42.5	35.0	37.5	35.0	37.5	35.0	35.0	40.0	32.5
22 CONSIDERABLE SWEATING	45.0	42.5	35.0	30.0	32.5	32.5	32.5	30.0	32.5	32.5	27.5
23 MODERATE FEVER	52.5	45.0	40.0	40.0	42.5	42.5	42.5	37.5	42.5	42.5	37.5
24 DROWSY; WANT TO FAT	35.0	32.5	22.5	32.5	35.0	32.5	30.0	30.0	30.0	32.5	30.0
25 SURES IN MOUTH/THROAT	20.0	25.0	20.0	17.5	15.0	15.0	10.0	15.0	12.5	25.0	20.0
26 SHAKES AND CHILLS	32.5	30.0	35.0	20.0	20.0	17.5	17.5	17.5	17.5	22.5	17.5
27 ACHES ALL OVER	10.0	10.0	12.5	10.0	12.5	7.5	10.0	10.0	7.5	12.5	12.5
28 DIFFICULTY IN STOPPING BLEEDING	42.5	37.5	35.0	37.5	37.5	37.5	40.0	32.5	35.0	37.5	15.0
29 THIRSTY AND HAS DRY MOUTH	17.5	10.0	15.0	17.5	17.5	15.0	12.5	10.0	10.0	20.0	12.5
30 WEAK AND FAINT	35.0	27.5	27.5	32.5	37.5	32.5	30.0	27.5	27.5	30.0	27.5
31 VERY DRY MOUTH AND THROAT	35.0	32.5	30.0	30.0	32.5	27.5	25.0	25.0	22.5	30.0	25.0
32 HEADACHE	27.5	25.0	25.0	20.0	20.0	17.5	12.5	15.0	12.5	20.0	12.5
33 RAPID HEARTBEAT	22.5	20.0	22.5	12.5	15.0	12.5	17.5	12.5	12.5	20.0	15.0
34 MAY FAINT WITH MODERATE EXERTION	32.5	27.5	27.5	27.5	30.0	27.5	22.5	22.5	25.0	25.0	22.5
35 EXTREMELY DRY MOUTH, THROAT, SKIN	12.5	12.5	15.0	17.5	17.5	17.5	10.0	10.0	7.5	17.5	12.5
36 VERY PAINFUL URETHRA	17.5	15.0	17.5	17.5	20.0	12.5	20.0	17.5	17.5	22.5	20.0
37 DIFFICULTY MOVING	20.0	17.5	20.0	12.5	15.0	15.0	12.5	12.5	12.5	12.5	15.0
38 SHORT OF BREATH	7.5	2.5	10.0	2.5	2.5	2.5	5.0	2.5	0.0	10.0	5.0
39 BURNING SKIN AND EYES	33.6	29.1	30.1	27.2	29.2	26.1	24.7	24.2	25.1	30.6	24.4
Average											

Table C.9. Continued.

Symptom Description	Task Number										Mean	
	12	13	14	15	16	17	18	Percent				
1 UPSET STOMACH	47.5	37.5	45.0	42.5	42.5	30.0	37.5	44.6				
2 CLAMMY AND SWEATY	37.5	32.5	35.0	35.0	35.0	30.0	35.0	38.6				
3 RUSSH-WATER-SPIT-SWALLS-FREQUENTLY	45.0	40.0	47.5	45.0	45.0	45.0	42.5	46.4				
4 NAUSEATED	32.5	22.5	27.5	25.0	27.5	22.5	22.5	30.0				
5 CONSIDERABLE SWEATING	32.5	27.5	30.0	27.5	30.0	25.0	27.5	33.1				
6 SWALLS-FREQUENTLY-TO-AVOID-VOMITING	37.5	25.0	32.5	32.5	35.0	27.5	27.5	35.7				
7 VOMITED ONCE OR TWICE MAY AGAIN	25.0	15.0	30.0	27.5	30.0	17.5	20.0	24.7				
8 VOMITED SEVERAL TIMES DRY HEAVES	30.0	10.0	27.5	30.0	25.0	10.0	12.5	23.3				
9 FEELS-UNCOMFORTABLE-URGE-TO-DEFECATE	27.5	17.5	22.5	25.0	22.5	12.5	12.5	23.6				
10 OCCASIONAL DIARRHEA RECENTLY DEFECATED	22.5	15.0	17.5	22.5	20.0	10.0	17.5	22.5				
11 FREQUENT DIARRHEA AND CRAMPS	15.0	5.0	10.0	15.0	15.0	10.0	10.0	15.4				
12 UNCOMFORTABLE-DIARRHEA-PAINFUL CRAMPS	10.0	2.5	7.5	12.5	10.0	2.5	2.5	7.1				
13 SUPPLEMENT TIKED WITH A MILD WEAKNESS	42.5	37.5	45.0	40.0	40.0	32.5	27.5	43.8				
14 TIRED WITH MODERATE WEAKNESS	27.5	20.0	27.5	25.0	25.0	17.5	12.5	30.0				
15 VERY TIRED AND WEAK	25.0	17.5	20.0	20.0	20.0	5.0	5.0	25.4				
16 EXHAUSTED WITH ALMOST NO STRENGTH	17.5	10.0	12.5	15.0	10.0	7.5	2.5	16.5				
17 SLIGHTLY LIGHTHEADED	22.5	7.5	30.0	30.0	27.5	22.5	17.5	29.7				
18 UNSTEADY-UPON STANDING-QUIKLEY	25.0	22.5	17.5	25.0	22.5	10.0	12.5	24.2				
19 FAINTS UPON STANDING QUICKLY	20.0	12.5	15.0	22.5	20.0	7.5	7.5	16.7				
20 MILD FEVER AND HEADACHE	35.0	30.0	37.5	37.5	37.5	37.5	32.5	37.4				
21 JOINTS-ACHE	37.5	32.5	27.5	25.0	25.0	20.0	20.0	31.9				
22 CONSIDERABLE SWEATING	40.0	32.5	35.0	35.0	35.0	27.5	30.0	36.4				
23 MODERATE FEVER	30.0	30.0	30.0	27.5	27.5	25.0	27.5	31.7				
24 DROWSY-WANT TO SLEEP	40.0	42.5	37.5	35.0	35.0	37.5	40.0	40.7				
25 SURFS IN MOUTH/THROAT	32.5	32.5	32.5	30.0	30.0	32.5	32.5	31.4				
26 SHAKES AND CHILLS	22.5	12.5	17.5	17.5	17.5	12.5	12.5	17.4				
27 AGES ALL OVER	22.5	15.0	22.5	20.0	20.0	12.5	12.5	20.7				
28 DIFFICULTY IN STOPPING BLEEDING	12.5	7.5	7.5	10.0	12.5	5.0	5.0	9.7				
29 THIRSTY AND HAS DRY MOUTH	35.0	32.5	30.0	27.5	30.0	25.0	25.0	34.0				
30 WEAK AND FAINT	30.0	30.0	30.0	27.5	30.0	27.5	27.5	29.9				
31 VEY DRY MOUTH AND THROAT	25.0	17.5	27.5	25.0	20.0	20.0	22.5	26.7				
32 HEADACHE	17.5	10.0	20.0	20.0	22.5	12.5	10.0	17.8				
33 RACID-URINE	20.0	12.5	10.0	12.5	15.0	7.5	7.5	15.1				
34 MAY FAINT WITH MODERATE EXERTION	25.0	22.5	25.0	22.5	22.5	22.5	22.5	25.1				
35 EXTREMELY DRY MOUTH, THROAT, SKIN	17.5	2.5	17.5	20.0	15.0	10.0	7.5	13.3				
36 VERY PAINFUL HEADACHE	20.0	10.0	15.0	15.0	12.5	5.0	7.5	15.7				
37 DIFFICULTY MOVING	12.5	5.0	17.5	15.0	15.0	7.5	10.0	14.0				
38 SHINY OF DEATH	12.5	0.0	7.5	10.0	10.0	2.5	2.5	5.3				
39 BURNING SKIN AND EYES	12.5	0.0	7.5	10.0	10.0	2.5	2.5	5.3				
Average	26.9	19.6	24.6	24.7	24.6	18.1	18.5	25.6				

Table C.10. Percent of responses in serious effect category for ordinary tasks on revisit questionnaire (43 respondents).

Symptom Description	Task Number						Mean
	1	2	3	4	5	6	
1 UPLST STOMACH	16.3	22.6	25.6	32.6	25.6	4.7	22.9
2 CLANNY AND SWEATY	4.7	9.3	9.3	16.3	11.6	11.6	10.5
3 MOUTH WATER; SWALLOWS FREQUENTLY	2.3	7.0	9.3	16.3	18.6	2.3	9.3
4 NAUSEATED	23.3	30.2	32.6	37.2	37.2	7.0	27.9
5 CONSIDERABLE SWEATING	4.7	23.3	14.0	25.6	20.9	2.3	15.1
6 SMALLUMS FREQUENTLY TO AVOID VOMITING	23.3	30.2	27.9	37.2	39.5	4.7	27.1
7 VOMITED SEVERAL TIMES; DRY HEAVES	32.6	39.5	20.5	53.5	44.2	14.0	37.2
8 VOMITED ONLY PAL TIMES; DRY HEAVES	48.8	53.5	51.2	60.5	55.8	32.6	50.4
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	30.2	44.2	34.9	44.2	46.5	9.3	34.9
10 OCCASIONAL DIARRHEA; FREQUENTLY DEFECATED	75.6	74.9	77.2	70.5	46.5	11.6	32.6
11 FREQUENT DIARRHEA AND CRAMPS	37.2	46.5	44.2	51.2	48.8	18.6	41.1
12 UNCONTROLLABLE DIAPHRASIS; PAINFUL CRAMPS	55.8	62.8	55.8	60.5	58.1	34.9	54.7
13 SUBMERSED, TIRED WITH A MILD WEAKNESS	9.3	22.6	18.6	27.9	25.6	4.7	19.0
14 TIRED WITH MODERATE WEAKNESS	9.3	25.6	23.3	25.6	30.2	9.3	20.5
15 VERY TIRED AND WEAK	34.9	48.8	34.9	48.8	46.5	7.0	36.8
16 EXHAUSTED WITH ALMOST NO STRENGTH	62.8	65.1	58.1	65.1	65.1	23.3	56.6
17 SLIGHTLY LIGHTHEADED	16.3	23.3	20.9	27.9	25.6	4.7	19.8
18 UNSTEADY UPON STANDING QUICKLY	10.2	41.9	37.2	39.5	37.2	9.3	32.6
19 EALIN; UNBIL STANDING QUICKLY	41.9	58.1	44.2	51.2	46.5	20.9	43.8
20 MILD FEVER AND HEADACHE	16.3	20.9	25.6	27.9	30.2	9.3	21.7
21 JOINTS ACHE	30.2	34.9	32.6	41.9	39.5	4.7	30.6
22 CONSIDERABLE SWEATING	4.7	14.0	8.3	18.6	7.0	4.7	9.7
23 MODERATE FEVER	7.0	14.0	14.0	14.0	9.3	0.0	9.7
24 DOESN'T WANT TO EAT	11.6	16.3	9.3	11.6	16.3	0.0	10.9
25 SURELY IN MODERATE WEAKNESS	9.3	14.0	16.3	14.0	11.6	0.0	10.9
26 SHAKES AND CHILLS	20.9	27.9	25.6	27.9	23.3	16.3	23.6
27 ACHES ALL OVER	30.2	34.9	30.2	41.9	37.2	9.3	30.6
28 DIFFICULTY IN STOPPING ALFEDING	44.5	55.8	58.1	58.1	58.1	30.2	51.2
29 THIRSTY AND HAS DRY MOUTH	4.7	11.6	20.9	14.0	18.6	2.3	12.0
30 NEAK AND FAINT	20.9	30.2	25.6	30.2	30.2	9.3	24.4
31 VERY DRY MOUTH AND THROAT	9.3	9.3	14.0	16.3	16.3	2.3	11.2
32 HEADACHE	14.0	9.3	25.6	23.3	27.9	9.3	18.2
33 RAPID HEARTBEAT	20.9	20.9	27.9	32.6	34.9	9.3	24.4
34 RAY PAIN; WITH MODERATE EXERCISE	46.5	55.8	53.5	53.5	48.8	18.6	46.1
35 EXTREMELY DRY MOUTH, THROAT, SKIN	11.6	11.6	18.6	18.6	14.0	7.0	13.6
36 VERY PAINFUL HEADACHE	41.9	37.2	34.9	44.2	46.5	18.6	37.2
37 DIFFICULTLY MOVING	44.2	55.8	46.5	51.5	48.8	18.6	44.6
38 SHORT OF BREATH	37.2	32.6	39.5	41.9	44.2	4.7	33.3
39 BURNING SKIN AND EYES	30.2	37.2	34.9	39.5	39.5	37.2	36.4
Average	24.8	32.0	30.3	35.5	34.2	11.4	28.0

Table C.11. Percent of responses in negligible effect category for ordinary tasks on revisit questionnaire (43 respondents).

Symptom Description	Task Number						Mean
	1	2	3	4	5	6	
1 LURST STOMACH	48.4	19.5	39.5	32.6	17.2	62.8	43.4
2 CLAMMY AND SWEATY	48.8	34.5	41.9	30.2	32.6	51.2	40.7
3 MOUTH RATHER SWALLOW FREQUENTLY	51.5	44.2	37.2	39.5	58.1	46.1	46.1
4 NAUSEATED	14.2	25.6	18.6	20.9	18.6	58.1	29.5
5 CONSIDERABLE SWEATING	48.8	37.2	37.2	32.6	34.9	58.1	41.5
6 SWALLOWS FREQUENTLY TO AVOID VOMITING	37.2	30.2	20.9	20.9	16.3	58.1	30.6
7 VOMITED SEVERAL TIMES; UPY HEAVLS	16.3	16.3	14.0	9.3	9.3	46.5	18.6
8 VOMITED SEVERAL TIMES; UPY HEAVLS	14.0	7.0	9.3	7.0	9.3	39.5	14.3
9 FEELS UNCOMFORTABLE URGE TO DEFECATE	25.6	18.6	20.9	16.3	14.0	58.1	25.6
10 OCCASIONAL DIARRHEA; RECENTLY DEFECATED	25.6	30.9	16.3	14.0	58.1	25.2	25.2
11 FREQUENT DIARRHEA AND CRAMPS	20.9	14.0	14.0	14.0	9.3	46.5	19.8
12 UNCOMFORTABLE DIARRHEA; PAINFUL CRAMPS	7.0	2.3	7.0	4.7	4.7	41.9	11.2
13 SUBNORMAL; IRRITATED WITH A MILD WEAKNESS	41.9	32.6	37.2	30.2	32.6	55.8	38.4
14 TIRED WITH MODERATE WEAKNESS	39.5	25.6	27.9	23.3	23.3	46.5	31.0
15 VERY TIRED AND WEAK	20.9	11.6	14.0	9.3	11.6	41.9	18.2
16 EXHAUSTED WITH ALMOST NO STRENGTH	4.2	2.3	7.0	4.7	2.3	46.5	11.2
17 SLIGHTLY LIGHTHEADED	39.5	30.2	27.9	25.6	27.9	58.1	34.9
18 UNSTEADY UPON STANDING QUICKLY	18.6	7.0	9.3	11.6	7.0	46.5	16.7
19 FAINTS UPON STANDING QUICKLY	14.6	9.3	11.6	9.3	11.6	46.5	12.8
20 MILD FEVER AND HEADACHE	34.9	27.9	25.6	23.3	25.6	44.2	30.2
21 JOINTS ACHE	27.9	16.3	16.3	16.3	16.3	41.9	22.9
22 CONSIDERABLE SWEATING	30.5	25.6	32.6	25.6	32.6	46.5	31.2
23 MODERATE FEVER	32.6	25.6	25.6	25.6	25.6	51.2	31.0
24 DOESN'T WANT TO EAT	32.2	27.9	34.9	30.2	27.9	53.5	35.3
25 SUPPLES IN THROAT/THROAT	32.6	21.3	27.9	25.6	20.9	53.5	30.6
26 SHAKES AND CHILLS	27.9	18.6	23.3	14.0	18.6	39.5	23.6
27 AGES ALL OVER	16.3	11.6	11.6	14.0	14.0	46.5	19.0
28 DIFFICULTY IN STOPPING BLEEDING	11.6	9.3	4.7	7.0	9.3	32.6	12.4
29 THIRSTY AND HAS DRY MOUTH	34.9	75.6	23.3	20.9	23.3	51.2	29.8
30 WEAK AND FAINT	18.6	14.0	14.0	11.6	16.3	34.9	18.2
31 VERY ILL/LOATH AND THROAT	32.6	25.6	27.9	21.3	20.9	44.2	29.1
32 HEADACHE	34.9	27.9	23.3	20.9	20.9	41.9	28.3
33 RAPID HEARTBEAT	20.9	16.3	16.3	14.0	16.3	39.5	20.5
34 MAX PAIN WITH MODERATE EXERCISE	14.0	9.3	2.3	4.3	9.3	41.9	14.3
35 EXTREMELY DRY MOUTH, THROAT, SKIN	10.2	25.6	20.9	25.6	25.6	46.5	29.1
36 VERY PAINFUL HEADACHE	16.3	23.3	16.3	14.0	16.3	41.9	21.3
37 DIFFICULTY MOVING	11.6	7.0	7.0	9.3	7.0	41.9	14.0
38 SHORT OF BREATH	14.0	11.6	7.0	11.6	9.3	51.2	17.4
39 BURNING SKIN AND EYES	23.3	16.3	20.9	14.0	14.0	30.2	19.8
Average	27.6	20.6	20.9	18.3	18.6	47.5	25.5

Appendix D

TASK ANALYSES RESULTS

Appendix D summarizes the results of analyses of individual military tasks used to compute the measures of crew positions in each crew. The data include (1) the percent of respondents who rated task performance in the no effect and cannot do categories, and (2) the mean expected percent of normal task performance for each of the four crews. The order of tasks is the same as was listed on the questionnaire.

Two sets of summary results are presented. The first set, Tables D.1 through D.8, contains the measures listed above unadjusted by the control complex symptom 112111. The second set, Tables D.9 through D.16, contains mean task performance percentages normalized for each respondent by dividing ratings for symptom complex 112111 by their respective ratings.

Table D.1. Percent of responses in no effect and cannot do categories for tasks on artillery gun crew questionnaire.

Symptom Complex	Task Number															
	1		2		3		4		5		6		7		8	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111a	71.58	0.00	68.42	0.00	57.89	0.00	68.42	0.00	55.56	0.00	26.32	0.00	72.22	0.00	42.11	0.00
112111	66.67	0.00	68.42	0.00	57.14	0.00	71.43	0.00	61.91	0.00	47.62	4.76	61.91	0.00	52.38	0.00
112121	28.57	4.76	47.62	4.76	42.86	4.76	52.38	4.76	28.57	4.76	19.05	4.76	47.62	4.76	28.57	4.76
112131	42.86	0.00	52.38	0.00	21.81	0.00	61.91	0.00	19.05	0.00	4.76	9.52	38.09	4.76	9.52	4.76
122111	15.00	4.76	47.62	4.76	42.86	4.76	52.38	4.76	38.09	4.76	19.05	23.81	42.86	14.29	23.81	19.05
212111	33.33	4.76	60.67	4.76	57.14	4.76	66.67	4.76	52.38	4.76	38.09	4.76	61.91	4.76	57.14	4.76
212121	23.81	0.00	61.91	0.00	38.09	0.00	61.91	0.00	23.81	0.00	14.29	4.76	42.86	0.00	19.05	0.00
222111	9.52	14.29	23.81	14.29	19.05	19.05	23.81	14.29	9.52	19.05	9.52	38.09	33.33	28.57	23.81	33.33
312111	47.62	0.00	36.19	4.76	61.91	4.76	70.19	0.00	61.91	0.00	19.05	4.76	57.14	0.30	47.62	0.00
312121	31.11	0.00	52.38	0.00	38.09	0.00	52.38	0.00	28.57	0.00	9.52	4.76	42.86	4.76	28.57	4.76
312131	28.57	4.76	47.62	4.76	28.57	4.76	37.14	4.76	23.81	4.76	14.29	9.52	47.62	9.52	19.05	4.76
312142	19.05	9.52	23.81	9.52	19.05	9.52	23.81	4.76	14.29	4.76	0.00	19.05	33.33	9.52	4.76	19.05
314112	9.52	14.29	19.05	14.29	14.29	19.05	19.05	14.29	14.29	19.05	9.52	42.86	19.05	28.57	19.05	38.09
314113	4.76	38.09	14.29	42.86	9.52	42.86	14.29	42.86	4.76	42.86	4.76	61.91	19.05	47.62	4.76	52.38
314113	4.76	23.81	19.05	23.81	9.52	28.57	19.05	23.81	4.76	28.57	4.76	57.14	19.05	38.09	0.00	52.38
314231	0.00	52.38	4.76	42.86	0.00	47.62	4.76	38.09	0.00	42.86	0.00	66.67	14.29	42.86	0.00	47.62
411111	19.05	0.00	32.78	0.00	28.57	0.00	37.14	0.00	14.29	0.00	14.29	9.52	37.14	0.00	14.29	0.00
412111	38.09	4.76	57.14	4.76	47.62	4.76	57.14	4.76	33.33	4.76	4.76	14.29	42.86	14.29	28.57	14.29
413111	14.29	4.76	38.09	4.76	19.05	4.76	42.86	0.00	14.29	0.00	4.76	4.76	38.09	0.00	19.05	0.00
414111	14.29	9.52	14.29	9.52	14.29	9.52	19.05	4.76	4.76	9.52	4.76	33.33	33.33	23.81	14.29	28.57
414112	0.00	19.05	14.29	14.29	4.76	9.52	23.81	9.52	0.00	9.52	0.00	38.09	14.29	19.05	0.00	38.09
415114	0.00	61.91	4.76	61.91	0.00	61.91	4.76	61.91	0.00	61.91	0.00	76.19	0.00	66.67	0.00	66.67
513111	14.29	4.76	33.33	4.76	23.81	4.76	28.57	4.76	23.81	4.76	4.76	23.81	42.86	19.05	14.29	23.81
514111	9.52	4.76	23.81	4.76	9.52	4.76	23.81	4.76	4.76	4.76	0.00	19.05	28.57	9.52	0.00	19.05
515223	4.76	23.81	9.52	19.05	4.76	19.05	9.52	9.52	0.00	14.29	0.00	71.43	14.29	38.09	0.00	42.86
515311	4.76	9.52	19.05	9.52	4.76	9.52	23.81	4.76	9.52	4.76	4.76	42.86	23.81	9.52	4.76	19.05
515411	0.00	23.81	4.76	23.81	4.76	23.81	9.52	23.81	0.00	23.81	4.76	61.91	9.52	33.33	0.00	42.86
521111	19.05	4.76	38.09	4.76	23.81	4.76	42.86	4.76	19.05	4.76	23.81	19.05	42.86	4.76	28.57	9.52
522111	4.76	38.09	14.29	42.86	9.52	42.86	14.29	33.33	0.00	38.09	4.76	57.14	19.05	42.86	4.76	52.38
535111	0.00	23.81	14.29	23.81	4.76	23.81	14.29	19.05	0.00	19.05	0.00	52.38	9.52	28.57	0.00	47.62
Average	29.23	13.49	34.34	13.33	23.99	13.81	36.57	11.43	18.84	12.54	10.40	29.37	34.31	18.25	16.96	23.02

^aIn order of severity, beginning with control symptom complex (normal).

Table D.1. Continued.

Symptom Complex	Task Number					
	5		10		11	
	No	Effect Do	No	Effect Do	No	Effect Do
	Cannot		Cannot		Cannot	
112111 ^a	57.89	0.00	57.89	0.00	36.84	0.00
113111	57.14	0.00	61.91	0.00	61.91	0.00
113121	33.33	4.76	33.33	4.76	33.33	4.76
114111	19.05	0.00	42.86	0.00	28.57	0.00
123111	23.81	4.76	28.57	4.76	38.09	4.76
211111	57.14	4.76	57.14	4.76	52.38	4.76
213111	23.81	0.00	38.09	0.00	42.86	0.00
224111	9.52	9.52	19.05	9.52	23.81	9.52
311111	47.62	0.00	61.91	0.00	61.91	0.00
312111	33.33	0.00	42.86	0.00	38.09	0.00
313111	28.57	4.76	47.62	9.52	38.09	4.76
313112	4.76	4.76	14.29	4.76	33.33	4.76
314112	19.05	9.52	23.81	9.52	23.81	14.29
314113	9.52	42.86	9.52	42.86	14.29	42.86
315113	4.76	23.81	4.76	19.05	9.52	19.05
334231	0.00	28.57	0.00	28.57	4.76	42.86
411111	23.81	0.00	61.91	0.00	33.33	0.00
412111	28.57	4.76	38.09	4.76	33.33	4.76
413111	23.81	0.00	28.57	0.00	28.57	0.00
414111	14.29	4.76	23.81	4.76	23.81	4.76
414112	0.00	9.52	19.05	9.52	19.05	14.29
415314	0.00	61.91	0.00	57.14	0.00	61.91
513111	23.81	4.76	38.09	4.76	33.33	4.76
514111	4.76	4.76	14.29	4.76	23.81	9.52
515223	0.00	28.57	4.76	23.81	9.52	28.57
515311	4.76	9.52	14.29	4.76	23.81	9.52
515431	4.76	23.81	14.29	23.81	9.52	23.81
521111	23.81	4.76	33.33	4.76	23.81	4.76
525111	4.76	38.09	9.52	38.09	23.81	38.09
535111	0.00	23.81	4.76	19.05	4.76	19.05
Average	19.55	11.90	28.28	11.27	27.74	12.54

^aIn order of severity, beginning with control symptom complex (normal).

Table D.2. Mean percent of normal performance for tasks on artillery gun crew questionnaire.

Symptom Complex	Task Number													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.	Mean S.D.
112111a	42.26 11.70	65.76 25.91	61.49 27.55	86.49 24.51	77.23 30.61	54.09 31.02	84.60 29.69	69.72 30.77						
113111	70.68 31.64	86.94 25.23	62.95 26.37	87.09 25.14	79.21 30.14	67.78 34.87	80.43 30.20	71.64 33.62						
113121	59.20 12.51	78.62 27.69	75.31 29.48	79.19 29.12	59.51 31.68	45.90 33.12	70.08 34.73	57.78 33.31						
114111	61.67 15.36	79.92 25.37	69.29 23.81	82.83 25.43	52.87 27.77	26.80 22.17	62.59 33.57	43.29 26.73						
121111	61.12 14.26	75.13 12.47	74.29 31.69	77.09 32.43	63.65 33.20	45.11 35.97	63.94 37.63	48.94 35.67						
211111	58.97 23.98	84.39 29.08	60.79 28.70	84.53 28.42	71.81 34.13	57.26 37.05	77.52 34.44	71.62 36.37						
213111	58.44 28.11	87.75 21.32	78.82 22.41	86.44 22.88	61.80 27.16	42.55 29.03	72.56 28.15	57.43 26.65						
224111	37.84 10.54	60.04 35.56	51.39 35.12	61.46 35.10	36.51 29.40	28.68 31.78	53.36 41.90	43.12 39.64						
311111	72.91 24.85	89.11 24.77	87.61 24.56	89.60 23.00	82.12 27.34	53.92 27.64	78.53 28.64	71.65 31.15						
312111	51.54 30.11	76.89 24.44	72.25 27.27	77.99 28.22	58.85 30.88	39.91 26.65	69.10 32.08	57.31 30.88						
313111	62.47 21.76	79.43 29.25	72.43 25.16	81.53 29.56	59.70 29.10	42.89 29.73	71.44 34.03	56.30 29.29						
313121	47.71 22.77	61.71 31.68	58.33 31.60	66.51 31.04	47.82 29.42	28.57 23.36	56.78 35.37	37.71 26.63						
314112	37.79 30.25	20.17 13.13	18.72 32.10	32.34 33.07	37.29 31.33	24.21 31.13	44.17 36.98	36.30 39.15						
315111	25.25 27.23	36.91 39.18	35.09 35.91	41.56 39.93	25.55 28.99	16.92 28.64	34.06 39.88	21.65 29.21						
315113	21.24 24.53	47.79 35.03	42.55 33.31	52.34 35.98	29.56 23.21	16.23 28.01	37.93 38.73	20.18 24.83						
316111	15.68 14.73	12.28 13.07	20.88 24.12	36.05 34.51	16.13 19.97	9.47 15.45	30.61 35.71	18.61 22.82						
411111	53.94 24.57	64.41 20.83	71.65 21.70	87.17 17.17	54.78 24.65	37.87 30.19	77.85 26.95	50.02 24.63						
412111	60.65 35.69	77.20 32.76	74.24 32.18	76.59 33.12	61.07 34.61	39.14 25.21	66.95 36.71	56.22 35.76						
413111	53.91 26.86	75.25 27.97	67.15 27.65	79.47 23.43	57.21 24.75	34.40 24.82	68.62 29.56	52.40 29.44						
414111	40.44 31.46	41.27 28.86	58.71 27.89	63.72 30.01	41.73 25.30	27.37 29.23	56.00 41.12	38.23 35.76						
414112	13.02 18.21	57.03 12.18	51.14 27.43	61.48 33.95	34.82 22.09	15.79 17.92	46.67 32.88	26.84 25.53						
415111	48.98 30.42	22.91 12.26	38.12 24.64	22.14 31.85	17.63 18.11	5.04 15.06	13.23 21.91	11.49 18.71						
511111	48.93 26.60	65.23 30.90	61.57 29.13	68.54 29.97	50.32 32.58	30.59 26.49	62.28 40.12	44.24 33.80						
512111	44.93 26.60	65.60 24.81	60.19 25.90	68.74 29.57	43.64 22.51	25.94 19.54	57.08 33.37	36.31 23.44						
512221	17.36 26.83	47.42 29.87	40.30 26.17	52.69 27.63	25.58 14.66	7.74 14.66	31.40 34.35	16.24 18.49						
515111	14.20 25.07	64.42 29.31	52.99 24.65	67.38 30.07	40.80 27.41	18.11 24.50	46.42 34.67	32.21 25.63						
515411	11.27 14.40	17.76 30.66	28.58 25.25	39.15 31.13	18.23 17.56	10.61 22.63	28.43 30.62	16.62 20.08						
521111	31.57 31.12	71.69 30.41	64.31 28.64	73.41 30.56	48.06 30.23	42.53 36.44	65.21 36.47	54.97 35.01						
525111	28.76 29.20	41.65 39.05	34.94 35.82	46.20 39.45	27.06 25.64	17.46 27.70	38.61 40.73	24.68 32.45						
536111	22.32 17.49	45.44 13.49	37.11 26.64	50.43 31.59	26.69 18.79	8.91 13.25	32.61 30.12	20.21 23.32						
Average	46.45	64.85	50.73	65.87	46.73	30.74	55.97	42.13						

a. In order of severity, beginning with control symptom complex (normal).

Table D.2. Continued.

Symptom Complex	Task Number					
	9		10		11	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111 ^a	78.24	31.19	76.23	31.17	70.24	29.05
113111	77.35	32.62	78.97	32.22	78.06	32.37
113121	63.02	33.74	63.22	34.52	64.25	31.57
114111	57.93	29.08	70.39	30.94	65.25	27.04
123111	56.80	32.78	60.74	33.86	63.74	33.46
211111	75.50	35.80	74.51	34.67	75.01	32.42
213111	61.06	29.74	71.43	29.53	72.94	27.52
224111	43.60	27.65	51.18	31.51	55.09	32.45
311111	71.67	31.23	82.54	28.80	81.22	27.52
312111	63.18	32.11	69.20	32.84	69.30	29.13
313111	64.94	32.39	70.16	37.49	68.30	30.77
313112	44.72	27.51	50.34	31.79	57.29	35.35
314112	46.95	35.28	50.08	35.44	51.24	35.12
314113	24.91	32.40	26.78	33.77	30.68	37.17
315113	32.49	28.39	36.31	30.62	41.34	31.72
334231	24.44	24.29	22.91	26.70	28.85	29.57
411111	57.16	29.35	80.91	27.46	69.12	27.87
412111	61.93	34.24	67.56	36.06	63.95	32.16
413111	63.89	29.23	65.39	29.94	64.91	27.26
414111	45.94	31.48	51.51	34.12	54.76	32.86
414112	41.11	26.88	51.82	34.37	48.47	33.71
415314	25.10	18.15	13.38	21.28	15.29	23.56
513111	53.74	34.28	61.38	37.16	60.10	33.10
514111	45.28	27.68	52.49	31.23	52.34	34.03
515223	21.42	20.92	30.92	28.87	35.21	33.43
515311	40.82	27.24	44.13	29.64	53.09	33.01
515411	25.66	27.93	33.46	35.59	28.62	29.06
521111	38.36	33.21	63.00	34.31	58.48	30.94
525111	32.51	33.24	34.25	35.38	39.43	40.63
535111	12.30	27.67	17.83	32.90	36.59	28.89
Average	47.76		53.14		55.17	

^aIn order of severity, beginning with control symptom complex (normal).

Table D.3. Percent of responses in no effect and cannot do categories for tasks on FDC questionnaire.

Symptom Complex	Task Number															
	1		2		3		4		5		6		7		8	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111a	78.26	0.00	73.91	0.00	86.96	0.00	47.83	0.00	65.22	0.00	56.52	0.00	60.87	0.00	60.87	0.00
113111	69.56	0.00	69.56	0.00	73.91	0.00	52.17	0.00	63.87	0.00	52.17	0.00	56.52	0.00	52.17	0.00
114121	70.43	0.00	74.78	0.00	73.91	0.00	21.74	0.00	39.13	0.00	26.09	0.00	39.13	0.00	34.78	0.00
114111	72.17	0.00	67.83	0.00	69.56	0.00	26.09	0.00	52.17	0.00	26.09	0.00	34.78	0.00	30.43	0.00
123111	60.87	4.35	72.17	13.04	60.87	4.35	26.09	8.70	47.83	8.70	34.13	8.70	30.43	8.70	34.78	8.70
211111	30.43	4.35	35.13	4.35	47.83	4.35	34.78	4.35	43.48	4.35	21.74	4.35	34.78	4.35	17.39	4.35
214111	47.83	0.00	60.87	0.00	65.22	0.00	26.09	0.00	56.52	0.00	26.09	0.00	30.43	0.00	34.13	0.00
224111	8.70	4.35	6.70	8.70	21.74	4.35	4.35	13.04	21.74	13.04	4.35	13.04	17.39	13.04	4.70	4.35
111111	14.78	0.00	60.87	0.00	52.17	0.00	34.78	0.00	43.48	0.00	26.09	0.00	47.83	0.00	26.09	0.00
112111	18.18	0.00	22.73	0.00	31.82	0.00	22.73	0.00	31.82	0.00	22.73	0.00	31.82	0.00	9.09	0.00
113111	30.43	0.00	34.13	0.00	47.83	0.00	13.04	0.00	26.09	0.00	8.70	0.00	30.43	0.00	21.74	0.00
114112	11.04	0.00	17.39	0.00	17.39	0.00	4.35	0.00	22.73	4.55	4.55	4.55	22.73	4.55	4.55	4.55
114113	4.17	16.67	8.33	12.50	16.67	16.67	4.17	12.50	12.50	12.50	4.17	12.50	12.50	8.33	0.00	8.33
117111	0.70	0.70	13.34	4.35	17.39	4.35	4.35	13.04	17.39	8.70	4.35	8.70	8.70	8.70	4.35	17.39
134211	0.00	26.09	8.70	21.74	13.04	26.09	0.00	17.39	13.04	17.39	4.35	21.74	13.34	17.39	4.35	17.39
411111	43.48	0.00	52.17	0.00	60.87	0.00	30.43	0.00	56.52	0.00	26.09	0.00	47.83	0.00	34.78	0.00
412111	29.17	0.00	41.67	0.00	41.67	0.00	16.67	0.00	29.17	0.00	25.00	0.00	37.50	0.00	8.33	0.00
413111	47.83	0.00	52.17	0.00	69.56	0.00	17.39	0.00	39.13	0.00	21.74	0.00	39.13	0.00	43.48	0.00
414111	30.43	0.00	39.13	0.00	43.48	0.00	13.04	0.00	30.43	0.00	18.18	0.00	26.09	0.00	11.04	0.00
414112	11.04	0.00	21.74	0.00	34.78	0.00	0.70	0.00	26.09	0.00	4.35	0.00	17.39	0.00	8.70	0.00
415111	0.00	30.43	0.00	39.13	11.04	10.43	0.00	34.13	17.39	34.78	0.00	34.13	8.70	34.13	0.00	30.43
514111	21.74	0.00	26.09	0.00	34.13	0.00	8.70	0.00	21.74	0.00	9.09	0.00	26.09	0.00	13.04	0.00
514112	11.04	0.00	17.39	0.00	26.09	0.00	0.00	4.35	13.04	4.35	8.70	4.35	17.39	4.35	4.35	4.35
515213	4.35	8.70	8.70	13.04	26.09	8.70	4.35	17.39	13.04	13.04	0.00	17.39	8.70	13.04	0.00	8.70
515311	4.35	0.00	17.39	0.00	34.13	0.00	0.00	4.35	21.74	4.35	0.00	4.35	13.04	0.00	13.04	0.00
515411	0.00	8.70	8.70	17.39	8.70	8.70	4.35	13.04	13.04	13.04	4.35	13.04	8.70	8.70	4.35	8.70
521111	21.74	4.35	16.67	4.35	43.48	4.35	13.04	4.35	21.74	4.35	8.70	4.35	26.09	4.35	11.04	4.35
525111	4.35	4.35	4.35	8.70	17.39	4.35	0.00	8.70	8.70	8.70	0.00	8.70	8.70	8.70	0.00	4.35
555111	0.00	4.35	0.00	13.04	13.34	4.35	0.00	13.04	13.04	4.35	4.35	4.35	13.04	4.35	0.00	4.35
Average	24.14	4.11	29.68	5.65	38.53	4.19	14.79	5.93	29.87	5.21	15.54	5.64	26.38	4.92	16.96	4.05

^aIn order of severity, beginning with control symptom complex (normal).

Table D.4. Mean percent of normal performance for tasks on FDC questionnaire.

Symptom Complex	1		2		3		4		5		6		7		8	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Task Number																
112111 ^a	87.76	24.80	91.87	15.32	93.05	18.87	81.26	19.76	83.91	24.40	82.17	22.68	92.61	11.23	82.19	24.11
113111	83.84	20.23	88.64	18.89	87.63	22.23	83.28	19.36	82.47	22.86	80.47	22.94	90.55	13.17	75.98	28.08
114111	50.37	31.06	71.01	27.91	70.41	30.23	67.07	24.65	68.41	30.92	61.30	30.45	81.59	21.81	65.90	30.14
115111	69.43	34.97	74.85	28.00	83.74	26.86	71.91	23.82	74.98	31.44	66.39	26.61	80.13	19.73	63.81	27.64
121111	75.30	34.06	73.52	36.02	80.87	28.45	64.79	30.64	71.34	33.39	64.46	34.53	76.12	28.89	57.16	36.82
211111	61.59	31.17	70.48	29.49	76.55	28.82	71.25	27.46	69.29	32.85	59.92	29.03	81.72	22.52	54.00	29.10
212111	68.03	32.76	86.02	27.85	84.23	25.22	73.70	22.85	75.66	30.17	63.87	28.01	83.11	16.08	67.69	36.33
221111	62.62	27.38	50.05	29.49	57.95	29.12	49.30	26.98	52.65	33.16	42.02	25.87	63.09	30.96	47.84	25.68
311111	64.81	29.55	82.88	25.60	76.38	28.45	74.09	24.67	73.48	27.80	64.32	28.08	85.72	17.46	61.56	28.54
312111	55.76	27.54	56.48	26.47	68.49	25.87	67.14	24.98	64.30	24.60	61.93	27.29	78.74	19.73	54.03	21.94
313111	62.14	29.45	74.11	26.04	73.53	28.78	61.21	21.81	60.15	29.65	50.17	25.05	76.72	22.05	56.83	29.54
314111	44.42	27.26	62.36	27.08	58.16	26.27	57.61	20.63	60.85	26.83	53.55	24.26	73.05	23.87	50.56	21.11
315111	42.08	26.64	51.86	30.75	54.10	28.16	50.46	26.32	51.71	32.89	47.55	25.31	67.26	27.68	43.85	24.89
316111	28.39	24.54	39.84	25.63	42.34	33.64	41.35	26.15	43.74	31.48	35.37	25.89	59.70	28.28	32.87	20.34
317111	36.14	27.09	56.14	28.75	58.23	30.94	40.77	26.23	48.45	32.52	41.13	24.53	59.64	29.89	38.62	24.94
318111	21.14	18.50	36.94	32.09	36.29	34.31	38.48	24.98	40.27	31.15	32.62	25.50	51.41	32.75	30.48	25.08
411111	68.50	31.15	78.58	26.50	78.78	29.20	71.59	22.79	77.64	28.27	62.23	27.08	83.29	19.55	63.10	30.43
412111	57.85	30.54	72.82	28.33	72.26	28.34	64.81	24.64	66.63	28.31	63.11	26.87	82.64	19.40	53.09	24.17
413111	65.16	32.96	79.07	25.44	84.12	27.49	65.51	22.07	68.72	29.51	60.33	25.55	82.83	17.85	70.42	24.32
414111	55.67	32.24	70.48	28.65	72.53	29.00	60.71	23.34	64.80	29.70	53.79	24.33	74.26	23.65	50.17	27.96
415111	44.47	28.24	64.31	27.59	63.78	31.38	56.78	22.67	60.93	30.63	47.69	23.81	71.80	19.51	47.72	23.27
416111	14.67	15.72	21.40	24.57	31.05	34.13	23.39	23.59	32.58	36.64	18.33	19.87	33.46	32.67	19.77	19.83
511111	51.68	28.79	68.07	25.18	69.79	27.43	61.46	20.70	61.52	28.25	51.01	25.34	76.86	20.61	51.16	27.34
512111	45.83	25.24	61.15	24.14	57.98	28.61	50.43	21.13	53.17	28.50	45.79	25.32	67.49	26.74	41.02	24.25
513111	10.43	22.06	42.89	29.96	51.57	35.89	35.86	25.36	41.26	31.16	31.18	20.01	52.99	29.04	29.96	16.35
514111	15.82	20.16	58.29	26.85	67.13	31.94	49.49	20.56	56.21	30.93	40.36	18.52	65.24	20.69	49.42	24.91
515111	44.41	16.76	39.98	29.76	45.02	27.22	36.24	24.29	43.36	31.00	32.68	24.49	52.79	26.04	31.26	24.03
521111	49.21	31.46	70.12	30.04	68.77	32.04	60.71	25.27	57.17	32.03	51.35	28.26	72.89	25.98	47.31	24.63
522111	43.15	21.00	44.93	24.83	51.03	28.60	44.64	18.72	47.30	24.05	39.04	19.66	59.41	25.87	36.72	18.53
531111	27.66	17.62	41.70	24.51	47.82	21.92	38.51	21.37	46.51	29.21	37.70	21.38	59.68	25.99	33.21	17.33
Average	50.28		62.66		63.12		57.13		59.96		51.39		71.23		50.26	

^aIn order of severity, beginning with control symptom complex (normal).

Table D.5. Percent of responses in no effect and cannot do categories for tasks on tank crew questionnaire.

Symptom Complex	Task Number											
	1		2		3		4		5		6	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111 ^a	70.00	0.00	75.00	0.00	67.50	0.00	70.00	0.00	67.50	0.00	80.00	0.00
113111	70.00	0.00	72.50	0.00	72.50	0.00	77.50	0.00	67.50	0.00	77.50	0.00
113121	60.00	0.00	70.00	0.00	67.50	0.00	65.00	0.00	62.50	0.00	72.50	0.00
114111	37.50	0.00	42.50	2.50	30.00	2.50	42.50	2.50	40.00	0.00	55.00	0.00
123111	55.00	2.50	57.50	5.00	50.00	5.00	60.00	2.50	55.00	2.50	65.00	5.00
211111	60.00	0.00	75.00	0.00	67.50	0.00	70.00	0.00	62.50	0.00	72.50	0.00
213111	37.50	0.00	50.00	0.00	37.50	0.00	45.00	0.00	37.50	0.00	57.50	0.00
224111	27.50	12.50	32.50	12.50	27.50	12.50	27.50	12.50	32.50	12.50	37.50	12.50
311111	47.50	0.00	50.00	0.00	42.50	0.00	47.50	0.00	35.00	0.00	52.50	0.00
312111	45.00	0.00	55.00	0.00	42.50	0.00	47.50	0.00	45.00	0.00	55.00	0.00
313111	43.57	0.00	56.41	0.00	43.59	0.00	48.72	0.00	38.46	0.00	61.54	0.00
313112	7.50	12.50	25.00	15.00	17.50	15.00	22.50	12.50	12.50	12.50	30.00	15.00
314112	15.00	25.00	17.50	27.50	10.00	27.50	7.50	25.00	17.50	25.00	20.00	25.00
314113	3.00	30.00	7.50	40.00	7.50	37.50	5.00	32.50	7.50	32.50	10.00	32.50
334211	5.00	42.50	10.00	42.50	10.00	42.50	7.50	40.00	15.00	37.50	12.50	37.50
411111	27.50	0.00	42.50	0.00	35.00	0.00	32.50	0.00	27.50	0.00	47.50	2.50
412111	50.00	0.00	52.50	0.00	47.50	0.00	50.00	0.00	47.50	0.00	55.00	0.00
413111	27.50	0.00	42.50	0.00	30.00	0.00	37.50	0.00	30.00	0.00	52.50	0.00
414111	12.50	2.50	37.50	2.50	35.00	2.50	32.50	2.50	32.50	2.50	40.00	2.50
414112	15.00	7.50	17.50	10.00	12.50	7.50	17.50	7.50	7.50	7.50	17.50	7.50
415114	0.00	60.00	2.50	65.00	2.50	62.50	0.00	60.00	0.00	65.00	5.00	60.00
513111	32.50	7.50	27.50	7.50	22.50	7.50	27.50	7.50	35.00	7.50	37.50	7.50
514111	12.50	5.00	17.50	7.50	7.50	7.50	10.00	5.00	15.00	5.00	25.00	7.50
515223	7.50	30.00	5.00	32.50	5.00	35.00	7.50	32.50	5.00	32.50	7.50	32.50
514111	7.50	25.00	7.50	27.50	2.50	25.00	10.00	25.00	10.00	27.50	10.00	25.00
515431	2.50	27.50	5.00	30.00	2.50	32.50	0.00	30.77	5.00	30.00	2.50	27.50
521111	25.00	17.50	30.00	17.50	20.00	17.50	22.50	20.00	30.00	17.50	25.00	17.50
525111	7.50	47.50	7.50	50.00	5.00	50.00	7.50	45.00	7.50	45.00	7.50	47.50
535111	5.00	32.50	7.50	35.00	2.50	37.50	5.00	32.50	2.50	32.50	7.50	37.50

Average 20.12 13.92 34.05 15.42 23.70 15.42 30.37 14.19 26.70 14.06 36.05 14.33 33.04 14.50 39.14 14.67

^aIn order of severity, beginning with control symptom complex (normal).

Table D.5. Continued.

Symptom Complex	Task Number		No Effect	Do	No Effect	Do
	9	10				
112111a	55.00	0.00	75.00	0.00		
113111	55.00	0.00	72.50	0.00		
113121	45.00	0.00	55.00	0.00		
114111	12.50	5.00	30.00	2.50		
123111	42.50	10.00	42.50	7.50		
211111	60.00	0.00	70.00	0.00		
213111	22.50	2.50	50.00	0.00		
224111	15.00	12.50	27.50	10.00		
311111	35.00	0.00	67.50	0.00		
312111	30.00	0.00	47.50	0.00		
313111	25.00	0.00	45.50	0.00		
313112	10.00	25.00	25.00	17.50		
314112	5.00	30.00	17.50	27.50		
314113	2.50	50.00	10.00	37.50		
315113	0.00	52.50	2.50	40.00		
334231	5.00	45.00	12.50	40.00		
411111	30.00	0.00	42.50	0.00		
412111	30.00	0.00	50.00	0.00		
413111	12.50	5.00	42.50	0.00		
414111	15.00	7.50	27.50	5.00		
414112	7.50	12.50	17.50	7.50		
415114	0.00	71.00	7.50	60.00		
513111	22.50	7.50	37.50	7.50		
514111	5.00	10.00	27.50	7.50		
515223	5.00	50.00	7.50	35.00		
519311	2.50	32.50	2.50	25.00		
515431	2.50	50.00	5.00	32.50		
521111	10.00	17.50	27.50	17.50		
525111	5.00	57.50	10.00	50.00		
535111	5.00	55.00	7.50	40.00		

Average 19.10 20.31 32.04 15.67

^aIn order of severity, beginning with control symptom complex (normal).

Table D.6. Mean percent of normal performance for tasks on tank crew questionnaire.

Symptom Complex	Task Number											
	1	2	3	4	5	6	7	8	Mean	S.D.	Mean	S.D.
112111	81.63	29.20	92.84	13.79	86.44	21.07	88.89	18.65	79.79	29.89	94.86	11.62
113111	50.75	30.64	94.60	13.29	87.20	22.04	90.68	18.78	79.25	30.67	93.03	14.28
114121	73.31	34.16	87.79	20.25	82.18	26.38	82.96	24.92	74.83	33.70	90.10	18.07
114111	55.29	36.87	72.93	27.57	61.09	29.83	73.44	27.43	37.09	36.11	64.76	19.63
123111	68.29	37.08	80.56	29.88	72.59	32.13	80.23	28.45	67.54	37.47	83.47	27.91
211111	72.27	34.94	89.98	18.97	83.65	24.46	86.20	22.45	75.04	33.19	88.67	20.16
213111	58.49	34.41	80.93	23.58	70.54	27.73	75.07	26.47	57.60	34.51	84.86	21.07
224111	44.57	37.42	63.36	33.95	53.49	35.41	59.73	33.60	48.91	38.48	68.73	34.15
311111	65.96	31.92	84.27	18.71	74.11	25.46	79.60	22.87	57.14	33.59	86.02	16.41
312111	80.78	36.95	79.88	25.82	69.21	29.58	75.90	26.13	61.77	36.01	82.91	22.68
313111	50.64	36.16	83.72	21.24	72.10	27.57	78.85	24.07	58.84	34.23	86.22	19.78
313112	26.81	24.93	57.72	34.23	44.92	32.21	54.84	31.86	35.47	29.20	64.12	33.48
314112	31.67	33.99	47.91	37.02	35.90	31.82	44.42	32.52	34.85	34.85	52.93	36.90
314113	20.54	23.84	31.55	32.77	27.96	31.38	33.44	31.03	23.46	27.62	42.40	35.81
315113	21.98	24.31	36.55	34.29	28.29	30.25	38.01	32.38	27.07	30.37	46.49	36.99
314231	17.59	25.01	33.16	35.88	27.41	32.43	30.23	32.21	27.19	34.35	39.86	36.81
411111	48.13	34.17	75.90	23.91	65.74	28.67	69.66	24.68	47.55	34.10	79.29	24.74
412111	63.47	37.93	80.09	24.83	72.11	29.59	76.70	26.10	63.09	36.64	82.33	23.16
413111	49.13	33.40	78.81	22.34	65.95	26.14	72.98	23.28	52.42	33.10	83.48	21.79
414111	49.26	37.45	68.43	29.90	60.24	32.84	65.11	29.10	50.25	36.63	73.23	27.62
414112	35.54	30.82	55.64	30.32	43.95	28.47	52.80	30.04	30.25	23.85	64.29	29.19
415114	8.94	13.21	17.74	28.17	15.85	22.85	18.37	25.81	9.04	14.29	21.43	32.12
513111	46.27	38.52	65.57	29.94	53.92	31.37	61.29	30.40	50.68	38.58	72.28	29.51
514111	32.48	28.86	57.05	28.54	43.14	25.89	52.51	24.88	36.39	29.76	68.25	25.70
515221	21.48	26.33	34.02	28.97	25.07	27.32	34.86	30.60	20.23	24.06	43.51	35.78
515311	22.69	26.15	39.87	32.22	29.02	24.96	42.30	33.11	24.98	28.62	50.78	36.68
515431	12.01	16.88	29.24	27.09	23.13	25.08	26.54	22.96	16.54	22.23	40.93	31.59
521111	41.39	36.90	59.27	35.85	49.14	34.17	53.24	35.05	44.88	38.96	62.38	34.55
524112	16.62	27.26	25.99	32.22	21.87	28.53	28.19	33.07	20.90	29.67	37.64	39.87
535111	18.09	23.78	33.54	31.94	23.16	24.68	34.40	30.42	19.60	21.45	40.00	36.09
Average	43.68	61.12	52.24	56.72	45.12	66.94	65.51	54.32				

^a In order of severity, beginning with control symptom complex (normal).

Table D.6. Continued.

Symptom Complex	Task Number		
	9	10	
	Mean	S.D.	Mean S.D.
112111a	84.57	18.98	90.18 18.79
113111	84.25	19.00	91.10 15.78
113121	75.18	24.85	81.57 22.80
114111	57.98	23.16	89.38 25.18
123111	66.23	34.48	70.61 31.80
211111	82.70	23.29	86.68 21.91
213111	66.25	24.32	80.09 23.24
224111	52.00	30.11	62.76 31.33
311111	76.51	19.69	86.11 18.98
312111	68.04	24.91	75.97 26.15
313111	68.43	21.81	77.83 22.31
313112	41.28	32.09	54.68 34.87
314112	38.02	30.32	47.86 36.27
314113	22.52	26.61	39.28 35.97
315113	18.71	23.58	30.70 30.56
334231	27.22	31.15	35.21 35.10
411111	72.61	21.55	78.05 22.66
412111	69.22	25.12	77.19 26.29
417111	61.55	23.31	76.09 23.93
414111	52.57	28.43	63.75 28.95
414112	45.33	26.24	56.36 28.39
415114	10.36	18.25	22.69 32.31
513111	59.68	28.43	67.38 31.32
514111	48.48	25.16	63.14 30.03
515221	22.98	28.68	33.47 30.13
515311	31.07	26.59	38.26 27.37
515431	18.80	24.70	32.60 29.76
521111	50.75	30.45	61.35 34.93
525111	21.04	28.91	31.11 35.59
535111	19.60	27.26	32.62 31.67
Average	50.52		60.51

^aIn order of severity, beginning with control symptom complex (normal).

Table D.7. Percent of responses in no effect and cannot do categories for tasks on TOW crew questionnaire.

Symptom Complex	Task Number															
	1		2		3		4		5		6		7		8	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111 ^a	75.61	0.00	60.49	0.00	63.41	0.00	63.41	0.00	85.37	0.00	41.46	0.00	46.34	0.00	40.00	0.00
113111	75.61	2.44	75.61	2.44	58.34	2.44	53.41	2.44	78.05	2.44	58.34	4.88	60.98	4.88	47.50	0.00
113121	63.41	2.44	65.65	2.44	48.78	2.44	48.78	2.44	68.29	2.44	36.59	4.88	43.90	4.88	23.08	0.00
114111	26.43	0.00	53.66	0.00	19.51	0.00	19.51	2.44	41.46	2.44	9.76	12.20	9.76	14.03	10.26	2.56
123111	56.10	2.44	58.34	2.44	39.02	2.44	41.46	4.88	58.34	2.44	28.39	4.88	26.83	4.88	23.08	2.63
211111	73.17	2.44	75.61	2.44	63.41	2.44	65.65	2.44	78.05	2.44	48.78	2.44	56.10	2.44	31.71	0.00
213111	43.90	0.00	53.66	2.44	21.95	2.44	21.95	2.44	48.78	2.44	12.20	4.88	9.76	4.88	17.07	2.44
224111	24.39	2.44	24.39	2.44	17.07	4.88	14.63	4.88	29.27	4.88	7.32	9.76	7.32	9.76	5.13	5.13
311111	58.34	0.00	63.41	0.00	48.78	0.00	43.90	0.00	63.41	0.00	41.46	2.44	43.90	2.44	22.50	0.00
312111	34.02	0.00	36.59	0.00	31.71	0.00	29.27	0.00	48.78	0.00	17.07	2.44	17.07	0.00	12.20	0.00
313111	34.02	0.00	34.02	0.00	29.27	0.00	24.39	0.00	51.22	0.00	17.07	4.88	19.51	4.88	12.20	0.00
313112	9.76	2.44	17.07	2.44	14.63	4.88	9.76	7.32	14.63	9.76	4.88	26.83	4.88	24.39	4.88	7.32
314112	19.51	9.76	17.07	9.76	9.76	17.07	9.76	19.51	17.50	20.00	9.76	39.02	4.88	36.59	2.44	17.07
314113	12.20	17.07	14.63	17.07	4.88	26.83	4.88	29.27	7.32	29.27	9.76	70.73	4.88	63.41	2.44	25.00
315113	5.30	22.50	7.50	22.50	5.00	30.00	5.00	30.00	10.00	30.00	0.00	68.29	2.44	56.10	2.50	25.00
316231	2.44	26.83	7.32	24.39	0.00	39.02	0.00	36.59	7.32	34.15	0.00	51.22	2.44	46.34	2.44	31.71
411111	34.15	0.00	48.78	0.00	34.15	0.00	26.83	4.88	57.85	0.00	29.27	0.00	27.50	0.00	7.32	2.44
412111	52.50	0.00	55.00	0.00	42.50	0.00	45.00	0.00	57.50	0.00	20.00	2.50	20.00	2.50	15.38	2.56
413111	26.83	0.00	39.02	0.00	19.51	0.00	19.51	0.00	39.02	0.00	7.32	9.76	17.07	9.76	7.50	0.00
414111	30.00	2.50	35.00	2.50	20.00	2.50	20.00	2.50	25.00	5.00	10.00	15.00	7.50	15.00	12.50	5.00
415112	7.32	4.88	17.07	7.32	4.88	14.63	4.88	12.20	12.20	17.07	2.44	34.15	0.00	31.71	2.50	15.00
415114	9.76	51.22	7.32	31.71	2.44	41.46	2.44	51.22	2.44	48.78	0.00	75.61	0.00	75.61	0.00	41.46
513111	29.27	2.44	21.95	2.44	17.07	7.32	17.07	7.32	24.39	4.88	7.32	14.63	7.32	14.63	2.50	7.50
514111	14.63	9.76	19.51	9.76	12.20	12.20	9.76	12.20	29.27	17.07	2.44	34.15	2.50	30.00	7.50	10.00
515223	2.44	21.95	14.63	14.63	0.00	42.50	2.44	34.15	2.44	34.15	0.00	75.61	0.00	68.29	2.50	40.00
515311	7.12	14.63	12.20	14.63	2.44	21.95	2.44	17.07	7.32	14.63	2.44	60.98	2.44	53.66	2.50	25.00
515411	2.44	21.95	9.76	17.07	2.44	26.83	2.50	32.50	2.44	36.59	2.44	63.41	0.00	58.34	0.00	30.77
521111	51.22	2.44	48.78	2.44	36.59	2.44	34.15	4.88	41.46	4.88	26.83	9.76	29.27	9.76	15.38	7.69
525111	15.00	26.00	15.00	17.50	7.50	32.50	7.50	27.50	10.00	32.50	0.00	70.00	0.00	69.23	2.50	30.00
535111	4.88	12.20	9.76	14.63	4.88	26.83	2.44	26.83	9.76	29.27	0.00	58.34	0.00	56.10	2.44	21.95
111121	80.00	0.00	80.00	0.00	72.50	0.00	70.00	0.00	82.50	0.00	57.50	0.00	67.50	0.00	38.46	0.00
112121	75.00	0.00	70.00	0.00	60.00	0.00	60.00	0.00	72.50	0.00	17.50	10.00	27.50	10.00	15.79	2.63
112131	21.50	2.50	30.00	2.50	22.50	5.00	25.00	5.00	37.50	2.50	15.00	10.00	35.00	0.00	30.00	0.00
112131	35.00	2.50	32.50	2.50	26.00	5.00	17.50	7.50	30.00	5.00	17.50	12.50	20.00	12.50	7.50	5.00
114112	21.75	14.63	21.95	14.63	14.63	19.51	14.63	17.07	19.51	26.83	7.32	46.34	9.76	43.90	2.50	22.50
214112	62.50	0.00	60.00	0.00	47.50	0.00	45.00	0.00	55.00	0.00	27.50	0.00	27.50	0.00	20.00	0.00
214112	12.20	12.20	14.63	12.20	14.63	14.63	9.76	14.63	14.63	17.07	7.32	41.46	2.44	39.02	0.00	14.63
214113	5.00	20.00	7.50	17.50	5.00	32.50	5.00	32.50	7.50	30.00	0.00	68.29	0.00	65.00	0.00	30.77
314111	21.95	2.44	24.39	2.44	14.63	9.76	12.20	9.76	21.95	9.76	9.76	24.39	4.88	24.39	2.44	7.32
Average	32.34	7.03	35.61	7.03	24.59	11.37	23.80	11.67	39.32	12.09	16.10	26.17	17.09	24.51	11.81	11.15

^aIn order of severity, beginning with control symptom complex (normal).

Table D.8. Mean percent of normal performance for tasks on TOW crew questionnaire.

Symptom Complex	Task Number													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.
1121118	91.79	22.29	71.95	88.53	17.87	95.36	10.25	88.22	13.70	87.61	13.62	93.30	10.26	
113111	87.89	24.75	85.69	27.24	59.40	38.52	68.51	23.86	92.22	19.49	86.51	26.52	93.81	10.36
113121	81.79	28.08	79.57	31.01	59.25	40.94	78.11	26.89	88.63	22.50	81.48	24.20	88.60	12.98
114111	88.28	25.15	73.01	31.31	32.93	34.26	85.73	26.04	70.91	25.91	57.08	29.64	59.93	30.42
123111	78.01	28.85	73.26	31.63	51.65	39.68	74.35	28.63	87.15	21.99	75.14	24.95	76.32	25.73
211111	87.96	23.63	86.59	26.01	72.15	38.20	87.05	22.78	92.62	18.74	86.07	20.78	87.95	19.97
213111	74.67	27.05	72.00	32.05	33.96	35.39	66.10	20.05	84.32	21.86	69.12	24.43	67.90	23.78
224111	61.11	27.31	56.39	28.81	31.41	32.32	58.54	25.66	76.32	23.82	59.63	27.41	60.69	27.29
311111	82.61	21.55	81.71	26.48	59.25	40.84	79.75	23.53	91.27	14.32	83.98	20.60	84.15	20.49
312111	73.90	25.32	66.26	28.69	44.03	39.13	68.07	27.15	84.29	19.75	76.21	19.55	75.02	17.45
313111	70.78	26.34	65.31	28.64	43.51	38.12	71.17	24.35	89.91	13.12	75.10	23.35	75.02	23.42
313121	59.04	25.94	48.05	28.42	26.04	31.91	48.46	26.83	62.83	29.25	43.81	31.50	46.52	32.32
314112	51.05	31.20	40.35	29.86	21.80	27.47	49.24	31.04	58.38	34.35	39.85	36.59	42.47	36.33
314113	40.90	30.68	39.04	31.05	14.64	21.52	37.01	30.34	46.98	34.65	20.67	35.98	23.16	34.25
315113	32.97	26.76	28.37	26.48	12.35	21.63	33.37	28.69	42.75	34.22	17.89	28.41	25.13	31.29
334231	30.95	26.59	29.08	26.62	9.59	12.23	50.19	26.33	40.59	34.44	26.15	29.93	29.54	31.38
411111	71.11	24.95	72.32	29.60	41.65	39.28	70.35	24.94	92.14	13.15	78.90	19.58	78.20	17.28
412111	79.08	20.11	75.72	29.29	55.25	39.24	77.62	23.84	88.06	16.12	75.45	20.81	75.13	21.21
413111	66.24	26.32	67.65	29.93	34.52	33.49	68.39	29.05	82.47	21.20	67.63	27.48	68.99	28.29
414111	65.12	27.65	62.14	31.43	34.18	34.97	60.35	28.64	73.80	25.17	52.70	29.88	52.15	29.11
414112	47.55	25.90	40.22	30.51	18.81	22.39	50.32	27.60	60.18	33.94	43.54	35.06	44.90	34.43
414314	73.46	31.44	73.64	26.70	7.97	16.37	22.06	27.80	29.29	32.41	13.04	24.65	13.13	25.17
513111	62.04	29.35	50.62	30.63	29.79	33.24	56.78	29.87	71.39	27.54	58.19	29.27	58.33	29.69
514111	52.08	24.23	49.51	31.34	24.03	29.74	53.67	28.39	66.22	35.08	41.88	33.88	44.79	32.99
515223	28.06	24.14	35.26	31.77	3.87	6.84	27.45	29.56	39.08	31.08	11.94	22.65	16.97	27.70
515311	34.80	29.60	39.20	30.79	10.89	15.84	36.56	25.33	51.61	29.57	19.12	28.42	26.07	32.18
515411	25.18	21.37	29.16	27.87	8.73	15.56	28.08	25.12	34.55	30.34	17.24	26.44	19.73	26.24
521111	74.48	30.60	70.17	31.42	46.64	41.59	68.13	29.49	78.12	27.44	70.37	31.27	71.22	31.83
525111	42.59	32.19	36.55	31.43	15.43	25.62	40.23	31.55	45.24	36.78	16.95	27.58	17.67	28.44
535111	16.04	26.64	34.66	27.51	13.25	21.33	33.34	27.41	43.81	35.42	22.75	30.59	25.34	31.13
111121	92.76	16.84	91.27	17.10	79.26	35.12	90.58	17.23	95.80	10.77	90.81	13.19	92.58	13.73
111131	67.56	33.94	65.58	35.11	40.69	39.81	65.51	29.77	75.66	30.23	67.65	29.53	69.82	31.65
112121	86.67	25.66	84.67	25.89	68.79	39.05	86.24	20.08	91.82	18.52	84.35	15.79	84.38	16.18
114131	62.35	28.35	58.03	30.66	34.32	36.55	61.24	29.65	76.03	25.79	62.03	28.29	62.37	29.36
114131	66.66	28.66	58.96	32.52	34.22	35.32	61.95	28.14	74.29	26.70	63.22	31.18	62.41	32.68
114112	47.01	34.13	47.86	31.32	24.78	32.58	48.31	32.32	53.97	37.75	32.28	34.33	35.74	36.42
212111	82.32	24.79	78.23	28.97	56.02	40.80	74.60	28.57	86.92	18.28	77.78	20.44	76.57	21.97
214112	45.32	29.32	41.78	30.38	25.58	32.24	48.94	29.74	56.20	32.81	38.98	36.40	38.76	34.72
214113	15.41	26.10	12.61	26.13	13.15	21.69	32.90	28.67	46.29	35.18	18.17	29.51	21.17	31.15
314111	98.82	28.00	54.43	30.65	24.13	31.41	54.74	29.04	69.59	29.43	49.96	33.77	49.04	33.09
Average	60.65	55.23	35.17	58.44	69.79	54.04	55.26	61.79	54.04	55.26	61.79	54.04	55.26	61.79

a.

Table D.9. Percent of responses in no effect and cannot do categories for tasks on artillery gun crew questionnaire.

Symptom Complex	Task Number															
	1		2		3		4		5		6		7		8	
	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do	No Effect	Cannot Do
112111	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	71.43	0.00	80.95	0.00	76.19	0.00	80.95	0.00	80.95	0.00	66.67	4.76	66.67	0.00	57.14	0.00
113121	42.86	4.76	57.14	4.76	52.38	4.76	61.91	4.76	47.62	4.76	42.86	4.76	57.14	4.76	61.91	4.76
115111	57.14	0.00	60.00	0.00	52.86	0.00	76.19	0.00	38.09	0.00	19.05	9.52	47.62	4.76	23.81	4.76
123111	57.14	4.76	57.14	4.76	61.91	4.76	57.14	4.76	61.91	4.76	47.62	23.81	52.38	14.29	38.09	19.05
213111	42.86	4.76	76.19	4.76	71.43	4.76	76.19	4.76	71.43	4.76	76.19	4.76	76.19	4.76	80.95	4.76
224111	42.86	0.00	76.19	0.00	66.67	0.00	76.19	0.00	52.38	0.00	52.38	4.76	61.91	0.00	42.86	0.00
311111	66.67	0.00	90.48	4.76	85.71	4.76	95.24	0.00	85.71	0.00	66.67	4.76	71.43	0.00	76.19	0.00
312111	52.86	0.00	61.91	0.00	47.62	0.00	61.91	0.00	47.62	0.00	23.33	4.76	57.14	4.76	47.62	4.76
313111	42.86	4.76	61.91	4.76	47.62	4.76	66.67	4.76	42.86	4.76	38.09	9.52	52.38	9.52	42.86	4.76
313121	28.57	9.52	28.57	9.52	28.57	9.52	28.57	4.76	23.81	4.76	19.05	19.05	42.86	9.52	19.05	19.05
314112	9.52	14.29	19.05	14.29	14.29	19.05	23.81	14.29	23.81	19.05	23.81	42.86	28.57	29.27	38.09	38.09
314113	9.52	38.09	19.05	42.86	14.29	42.86	19.05	42.86	14.29	42.86	14.29	61.91	23.81	47.62	9.52	52.38
315111	9.52	21.81	23.81	21.81	19.05	28.57	23.81	23.81	9.52	28.57	57.14	9.52	23.81	38.09	4.76	52.38
315211	5.76	52.38	9.52	52.86	4.76	47.62	14.29	38.09	4.76	52.86	9.52	66.67	14.29	42.86	14.29	47.62
411111	42.86	0.00	76.19	0.00	52.38	0.00	76.19	0.00	38.09	0.00	38.09	9.52	71.43	0.00	28.57	0.00
412111	52.38	4.76	66.67	4.76	52.38	4.76	66.67	4.76	61.91	4.76	42.86	14.29	52.38	14.29	52.38	14.29
413111	31.33	5.76	57.14	4.76	38.09	4.76	57.14	0.00	47.62	0.00	42.86	4.76	52.38	0.00	42.86	0.00
414111	21.81	9.52	23.81	9.52	19.05	9.52	23.81	4.76	23.81	9.52	19.05	33.33	42.86	23.81	19.05	28.57
414112	9.52	19.05	19.05	14.29	9.52	9.52	28.57	9.52	9.52	9.52	4.76	38.09	23.81	19.05	4.76	38.09
415111	4.76	41.91	4.76	41.91	0.00	61.91	4.76	61.91	0.00	61.91	0.00	76.19	4.76	66.67	4.76	66.67
511111	29.57	4.76	47.62	4.76	31.33	4.76	42.86	4.76	42.86	4.76	23.81	23.81	52.38	19.05	33.33	23.81
514111	21.81	4.76	33.33	4.76	28.57	4.76	38.09	4.76	23.81	4.76	14.29	19.05	38.09	9.52	14.29	19.05
515211	9.52	23.81	14.29	19.05	9.52	19.05	14.29	9.52	4.76	14.29	4.76	71.43	14.29	38.09	4.76	42.86
515311	14.29	9.52	23.81	9.52	9.52	9.52	28.57	4.76	23.81	4.76	14.29	42.86	33.33	9.52	9.52	19.05
515411	4.76	21.81	14.29	21.81	9.52	23.81	19.05	23.81	9.52	23.81	14.29	42.86	19.05	33.33	9.52	42.86
521111	38.09	5.76	52.38	4.76	42.86	4.76	52.38	4.76	42.86	4.76	42.86	19.05	52.38	4.76	52.38	9.52
525111	9.52	38.09	19.05	42.86	14.29	42.86	19.05	33.33	4.76	38.09	9.52	57.14	23.81	42.86	14.29	52.38
535111	9.52	23.81	23.81	23.81	14.29	23.81	23.81	19.05	9.52	19.05	0.00	52.38	9.52	28.57	0.00	47.62
Average	11.15	11.47	14.76	11.13	14.51	11.81	16.51	11.43	32.87	12.24	30.40	22.17	43.42	10.25	32.86	23.02

NOTE: Task percentages were adjusted by symptom set 112111.

^a In order of severity, beginning with control symptom complex (normal).

Table D.9. Continued.

Symptom Complex	Task Number			
	9	10	11	
	No Cannot Effect Do	No Cannot Effect Do	No Cannot Effect Do	No Cannot Effect Do
112111 ^a	100.00	0.00	100.00	0.00
113111	60.67	0.00	21.43	0.00
113121	57.14	4.76	57.14	4.76
114111	33.33	0.00	66.67	0.00
123111	42.86	4.76	47.62	4.76
211111	71.43	4.76	21.43	4.76
213111	42.86	0.00	61.91	0.00
224111	23.81	9.52	33.33	9.52
311111	71.43	0.00	60.95	0.00
312111	52.38	0.00	57.14	0.00
313111	47.62	4.76	61.91	9.52
313112	19.05	4.76	28.57	4.76
314112	33.33	9.52	38.09	9.52
314113	19.05	42.86	19.05	42.86
315113	9.52	23.81	14.29	19.05
332111	28.57	28.57	9.52	28.57
411111	47.62	0.00	85.71	0.00
412111	47.62	4.76	57.14	4.76
413111	52.38	0.00	57.14	0.00
414111	28.57	4.76	33.33	4.76
414112	19.05	9.52	38.09	9.52
512111	47.62	41.91	4.76	57.14
513111	47.62	4.76	61.91	4.76
514111	19.05	4.76	28.57	4.76
515223	4.76	20.57	14.29	23.81
515311	9.52	9.52	28.57	4.76
515411	14.29	23.81	28.57	23.81
521111	47.62	4.76	57.14	4.76
525111	14.29	38.09	14.29	38.09
535111	4.76	23.81	9.52	19.05
Average	35.40	11.90	44.25	12.54

NOTE: Task percentages were adjusted by symptom set 112111.

^aIn order of severity, beginning with control symptom complex (normal).

Table D.10. Mean percent of normal performance for tasks on artillery gun crew questionnaire.

Symptom Complex	Task Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.
112111 ^a	107.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
113111	87.80	95.82	94.85	93.73	94.63	85.32	88.80	85.50	85.32	85.32	85.32	85.32	85.32	85.32	85.32	85.50
114111	66.81	82.22	82.22	82.22	82.22	82.22	82.22	82.22	82.22	82.22	82.22	82.22	82.22	82.22	82.22	82.22
115111	75.53	89.02	81.48	91.53	71.05	46.61	70.83	60.59	46.61	46.61	46.61	46.61	46.61	46.61	46.61	60.59
123111	77.75	85.02	85.07	85.29	82.32	64.36	72.54	64.82	64.36	64.36	64.36	64.36	64.36	64.36	64.36	64.82
211111	68.92	91.32	89.25	91.69	84.83	85.09	88.95	88.10	85.09	85.09	85.09	85.09	85.09	85.09	85.09	88.10
213111	72.74	96.03	91.81	94.85	79.79	70.41	85.86	78.16	70.41	70.41	70.41	70.41	70.41	70.41	70.41	78.16
224111	44.25	68.50	62.53	70.13	51.28	45.08	58.71	53.41	45.08	45.08	45.08	45.08	45.08	45.08	45.08	53.41
311111	85.12	93.17	93.22	92.91	92.91	82.24	91.59	92.22	82.24	82.24	82.24	82.24	82.24	82.24	82.24	92.22
312111	74.21	98.45	84.41	85.44	74.92	64.25	75.75	72.56	64.25	64.25	64.25	64.25	64.25	64.25	64.25	72.56
313111	72.82	88.39	82.82	88.97	74.31	65.83	78.21	75.40	65.83	65.83	65.83	65.83	65.83	65.83	65.83	75.40
313112	55.41	67.52	67.13	73.53	62.07	47.96	64.94	50.87	47.96	47.96	47.96	47.96	47.96	47.96	47.96	50.87
314112	42.98	62.35	55.34	62.65	47.18	39.24	50.08	46.67	39.24	39.24	39.24	39.24	39.24	39.24	39.24	46.67
314113	10.97	43.11	41.40	46.04	34.78	26.28	38.15	32.03	26.28	26.28	26.28	26.28	26.28	26.28	26.28	32.03
315113	11.72	54.00	48.86	56.83	38.04	25.93	44.97	28.21	25.93	25.93	25.93	25.93	25.93	25.93	25.93	28.21
334231	18.99	37.08	32.95	41.36	30.36	19.21	34.05	29.80	19.21	19.21	19.21	19.21	19.21	19.21	19.21	29.80
411111	67.27	92.87	64.95	92.94	68.07	59.94	66.66	66.60	59.94	59.94	59.94	59.94	59.94	59.94	59.94	66.60
412111	72.93	86.00	83.64	85.57	77.31	65.40	71.81	70.24	65.40	65.40	65.40	65.40	65.40	65.40	65.40	70.24
413111	68.71	86.91	80.72	90.22	73.00	62.26	81.65	73.12	62.26	62.26	62.26	62.26	62.26	62.26	62.26	73.12
414111	54.14	67.35	65.73	70.07	54.38	43.72	62.09	46.56	43.72	43.72	43.72	43.72	43.72	43.72	43.72	46.56
414112	19.40	61.65	59.77	70.19	48.65	28.12	53.90	37.01	28.12	28.12	28.12	28.12	28.12	28.12	28.12	37.01
415114	17.96	25.76	23.43	25.40	19.60	10.13	19.01	21.16	10.13	10.13	10.13	10.13	10.13	10.13	10.13	21.16
513111	61.72	78.80	73.52	78.95	67.18	50.70	70.70	58.44	50.70	50.70	50.70	50.70	50.70	50.70	50.70	58.44
514111	58.02	73.62	73.10	77.76	60.91	45.52	66.36	43.48	45.52	45.52	45.52	45.52	45.52	45.52	45.52	43.48
515231	33.28	51.40	45.83	59.71	33.64	13.72	36.57	23.41	13.72	13.72	13.72	13.72	13.72	13.72	13.72	23.41
515311	46.34	68.92	60.19	75.63	55.97	29.39	55.10	43.48	29.39	29.39	29.39	29.39	29.39	29.39	29.39	43.48
515431	20.30	42.16	35.57	47.15	30.19	12.93	37.19	27.58	12.93	12.93	12.93	12.93	12.93	12.93	12.93	27.58
521111	63.84	80.12	74.53	81.07	64.72	61.21	76.23	71.13	61.21	61.21	61.21	61.21	61.21	61.21	61.21	71.13
525111	34.07	45.85	43.48	52.12	35.95	25.58	43.55	33.49	25.58	25.58	25.58	25.58	25.58	25.58	25.58	33.49
535111	27.87	50.05	43.21	55.54	36.05	17.35	38.19	28.47	17.35	17.35	17.35	17.35	17.35	17.35	17.35	28.47

Average 55.91 72.07 65.19 74.40 60.71 48.99 64.05 56.20

NOTE: Task percentages were adjusted by symptom set 112111.

^aIn order of severity, beginning with control symptom complex (normal).

Table D.10. Continued.

Symptom Complex	Task Number					
	9	10	11	Mean	S.D.	Mean
	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111 ^a	100.00	0.00	100.00	0.00	100.00	0.00
113111	86.58	21.97	88.68	20.17	90.27	16.91
113121	79.25	29.60	78.43	30.34	82.85	27.99
114111	73.20	24.82	86.67	21.98	83.78	20.71
123111	71.99	30.01	74.60	29.65	80.48	27.63
211111	86.16	26.94	86.76	25.93	87.90	27.12
213111	75.76	24.82	87.64	18.06	90.30	14.95
224111	58.09	32.54	64.06	33.34	70.31	32.44
311111	89.07	20.15	95.21	9.53	95.39	12.34
312111	78.36	26.77	82.65	26.09	87.31	19.91
313111	79.27	26.93	82.09	31.13	86.23	25.19
313112	57.30	29.53	64.71	31.18	73.25	32.07
314112	56.60	37.22	60.90	36.86	61.86	37.64
314113	35.23	39.38	36.57	40.22	41.75	42.79
315113	41.42	33.18	49.81	33.39	55.02	35.12
334231	36.70	34.14	38.14	33.49	40.76	39.43
411111	71.35	30.14	94.06	15.61	83.92	19.05
412111	73.92	31.08	79.29	30.57	79.39	28.46
413111	60.47	24.93	81.65	25.25	85.01	21.98
414111	56.99	33.16	62.84	32.80	68.14	31.13
414112	55.21	32.41	64.48	35.29	62.98	36.55
415314	19.77	30.03	21.32	29.15	24.12	34.61
513111	70.58	34.05	77.00	33.91	78.22	29.71
514111	60.04	29.76	67.02	30.49	69.50	33.69
515223	33.30	31.49	43.90	36.29	49.27	40.18
515311	50.35	29.53	58.14	31.96	66.05	35.37
515431	37.45	35.21	45.97	41.09	41.01	36.25
521111	73.07	32.76	77.19	29.86	76.02	30.49
525111	41.70	39.49	43.08	40.03	48.61	42.96
535111	40.31	32.03	46.30	33.33	50.42	35.24
Average	62.33		67.98		70.34	

NOTE: Task percentages were adjusted by symptom set 112111.

^aIn order of severity, beginning with control symptom complex (normal).

Table D.11. Percent of responses in no effect and cannot do categories for tasks on FDC questionnaire.

Symptom Complex	Task Number													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Do	Do	Do	Do	Do	Do	Do	Do	Do	Do	Do	Do	Do	Do
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
112111 ^a	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
113111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
113121	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
114111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
123111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
211111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
213111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
224111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
311111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
312111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
313111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
313112	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
315112	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
314113	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
315113	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
334211	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
411111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
412111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
413111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
414111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
414112	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
512111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
513111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
514111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
515223	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
515411	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
521111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
525111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
535111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Average	22.21	4.11	14.02	2.63	41.52	4.19	31.42	5.91	40.92	5.21	21.04	3.64	32.03	4.95

NOTE: Task percentages were adjusted by symptom set 112111.

^a In order of severity, beginning with control symptom complex (normal).

Table D.12. Mean percent of normal performance for tasks on FDC questionnaire.

Task Number

Symptom Complex	1		2		3		4		5		6		7		8	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
112111 ^a	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
113111	99.40	19.19	95.27	12.67	91.34	15.66	90.56	11.06	94.64	10.63	95.86	9.91	95.76	9.59	87.08	19.46
113121	99.20	11.00	92.06	27.43	75.84	28.20	81.56	21.91	80.29	22.10	72.08	31.97	86.29	19.20	77.86	26.97
113111	76.74	10.42	74.64	24.73	67.24	22.44	61.98	21.63	80.15	25.84	70.36	21.03	84.51	16.44	70.64	21.41
171111	91.49	21.75	71.72	34.56	85.21	25.12	76.41	30.82	80.52	31.24	73.56	31.94	79.84	28.52	65.74	33.43
211111	72.91	19.26	76.57	27.63	61.51	23.82	86.21	21.01	61.88	27.66	73.08	30.24	86.52	21.40	65.22	26.92
213111	77.75	28.74	65.16	23.23	68.32	19.85	86.58	16.97	85.17	21.90	73.98	23.79	86.96	10.26	80.74	26.26
224111	51.17	10.09	54.68	29.92	62.58	27.18	61.07	30.57	62.26	33.20	53.05	32.01	66.10	31.68	57.17	20.63
311111	71.44	24.05	87.91	20.14	80.83	24.55	84.49	18.24	83.66	22.00	75.22	23.58	91.11	12.33	74.56	23.24
312111	59.71	26.10	70.10	22.38	71.42	23.29	80.26	22.44	75.01	27.17	71.32	27.68	84.36	16.40	54.48	21.09
313111	70.30	26.50	74.71	23.95	77.70	25.98	75.25	22.76	70.02	25.10	61.21	24.76	82.13	10.37	69.19	24.56
113117	20.71	25.03	62.67	24.90	61.90	23.17	71.21	21.54	72.26	26.23	65.38	25.68	77.70	21.32	52.30	22.79
114112	47.75	26.74	54.88	29.40	56.91	25.62	61.01	29.17	62.05	34.05	57.26	32.54	71.47	26.41	51.83	26.13
114111	31.46	26.75	42.57	24.03	45.45	32.87	49.78	30.57	50.07	32.16	43.32	31.28	63.03	28.31	39.56	23.12
112112	42.40	27.28	51.00	27.00	52.70	31.88	52.10	33.16	57.22	32.50	50.89	23.41	62.54	29.15	58.16	30.76
114211	28.10	19.74	39.24	31.43	38.69	33.76	47.00	30.24	46.23	34.34	40.82	30.22	54.14	32.71	16.17	26.99
411111	71.50	27.64	61.75	23.24	60.66	26.29	64.39	13.54	83.53	20.19	72.55	22.60	88.29	16.66	76.40	26.29
412111	67.11	27.54	59.11	25.84	73.54	23.97	76.25	21.10	75.44	23.57	75.50	27.21	87.06	16.86	58.32	26.54
413111	65.30	25.19	64.69	20.49	88.31	23.54	77.25	20.58	78.61	25.49	71.84	24.65	88.13	14.05	82.02	21.71
414111	64.05	30.65	75.81	28.19	78.06	27.48	72.36	24.90	73.83	25.00	63.20	30.48	78.11	22.68	60.78	27.90
415111	21.19	25.22	67.51	25.11	67.92	20.55	69.24	23.14	70.27	25.29	58.51	26.22	76.78	16.34	59.54	26.73
415114	17.61	18.51	27.40	24.89	32.92	33.80	31.52	31.33	40.24	40.98	24.73	28.63	35.20	33.52	24.21	22.88
413111	60.71	28.69	74.74	23.74	74.71	23.74	75.06	74.24	72.83	25.57	62.28	27.09	82.54	18.52	61.23	26.91
214111	23.13	25.42	64.95	21.00	61.50	36.26	61.89	26.48	62.16	28.15	53.33	26.61	71.43	25.14	49.76	27.40
215211	16.52	24.27	46.37	30.18	55.50	34.53	47.13	33.47	50.26	33.91	39.54	24.52	56.07	29.15	39.43	27.41
415101	42.49	27.74	62.58	25.83	71.43	32.27	62.87	28.96	63.42	27.90	51.84	24.38	69.92	19.24	60.67	26.97
217611	42.16	18.10	41.94	31.18	48.52	27.07	43.76	29.07	50.63	34.13	39.86	27.78	55.71	25.80	30.22	26.09
521111	7.50	10.24	75.11	24.89	74.31	29.72	74.80	27.00	66.56	30.42	63.13	30.48	78.47	25.11	50.12	31.66
523111	10.40	24.70	48.67	23.47	55.09	27.08	55.33	25.85	60.30	38.48	50.96	28.87	63.47	27.79	46.40	22.35
519111	12.64	28.00	55.22	27.19	51.16	26.30	51.16	31.40	55.93	28.83	47.16	24.00	63.20	24.76	42.93	21.65
Average	51.50		62.09		69.12		69.22		69.78		61.99		75.63		50.92	

NOTE: Task percentages were adjusted by symptom set 112111.

^aIn order of severity, beginning with control symptom complex (normal).

Table D.13. Continued.

Task Number			
Symptom Complex	9 No Effect Do	10 Cannot Effect Do	11 Cannot Effect Do
112111 ^a	100.00	0.00	100.00
113111	77.50	0.00	92.50
113121	57.50	0.00	62.50
114111	25.00	2.50	62.50
123111	55.00	7.50	52.50
211111	75.00	0.00	65.00
213111	45.00	0.00	62.50
224111	22.50	12.50	27.50
311111	57.50	0.00	62.50
312111	50.00	0.00	57.50
313111	43.50	0.00	58.97
313112	12.50	25.00	27.50
314112	10.00	30.00	17.50
314113	2.50	50.00	10.00
315113	0.00	52.50	2.50
323211	5.00	55.00	12.50
411111	52.50	0.00	60.00
412111	42.50	0.00	62.50
413111	32.50	0.00	52.50
414111	17.50	7.50	32.50
414112	10.00	12.50	22.50
415315	0.00	71.50	7.50
513111	25.00	7.50	47.50
514111	7.50	10.00	30.00
515221	7.50	47.50	7.50
515311	2.50	32.50	5.00
515431	2.50	50.00	5.00
521111	22.00	12.50	37.50
525111	5.00	57.50	10.00
535111	5.00	55.00	7.50
Average	28.95	19.61	19.55

NOTE: Task percentages were adjusted by symptom set 112111.

^aIn order of severity, beginning with control symptom complex (normal).

Table D.14. Mean percent of normal performance for tasks on tank crew questionnaire.

Symptom Complex	Task Number							
	1	2	3	4	5	6	7	8
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.
112111 ^a	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
113111	97.50	99.19	96.36	97.49	95.50	97.24	98.12	98.75
113121	86.54	93.17	91.03	90.07	88.75	93.78	92.63	99.29
114111	68.05	78.07	71.69	83.25	72.77	88.66	82.97	77.98
123111	60.50	83.58	80.91	86.09	79.79	87.49	85.88	91.00
211111	87.62	94.96	93.07	93.91	92.54	92.82	92.90	94.58
213111	72.29	84.63	78.70	81.72	73.02	87.14	86.05	82.49
224111	51.89	67.55	60.43	65.47	57.99	71.75	69.24	66.81
311111	80.22	90.22	84.33	88.80	72.50	90.98	90.39	89.38
312111	72.80	84.40	78.73	83.01	75.38	85.55	84.11	85.96
313111	73.37	89.06	80.92	86.99	74.70	90.49	88.03	88.55
313112	17.40	60.66	50.57	59.69	45.77	66.37	63.35	59.50
314112	37.96	50.48	41.79	48.77	41.73	55.36	53.93	50.38
314113	24.75	36.23	32.72	37.27	29.48	44.26	45.21	34.48
315111	27.45	38.76	33.55	42.21	33.29	48.52	45.25	34.59
334231	22.67	35.69	32.44	33.67	32.97	41.80	40.24	38.65
411111	60.47	80.77	74.18	77.58	61.71	84.14	83.07	76.04
412111	75.82	84.61	81.38	84.87	77.53	85.50	85.91	83.34
413111	61.42	83.97	76.93	81.14	68.71	87.10	83.38	82.42
414111	57.83	71.93	68.76	72.74	62.01	76.21	76.12	66.58
415112	44.21	60.50	49.84	57.73	40.62	67.23	65.46	57.54
415114	11.44	18.58	15.88	20.47	11.38	22.12	19.51	18.88
513111	56.99	69.26	61.37	67.59	61.98	74.83	72.35	70.75
514111	39.66	60.13	49.54	58.70	47.69	71.53	68.80	55.62
515223	26.56	36.08	27.51	37.16	25.07	46.38	41.20	43.53
515311	27.97	41.71	33.75	45.75	30.34	53.64	51.36	43.53
515312	16.08	30.85	28.62	29.48	21.18	42.45	41.05	35.47
521111	51.19	63.10	56.93	61.25	55.32	65.01	64.30	59.92
525111	19.42	27.65	25.65	31.04	24.27	38.72	33.25	33.83
535111	21.48	35.04	26.10	37.06	23.90	41.34	37.62	30.40
Average	51.10	65.03	59.39	64.70	55.93	69.95	68.06	63.81

NOTE: Task percentages were adjusted by symptom set 1121111.

^aIn order of severity, beginning with control symptom complex (normal).

Table D.14. Continued.

Symptom Complex	Task Number			
	9	Mean	S.D.	10 Mean S.D.
112111 ^a	109.00	0.00	100.00	0.00
113111	94.52	11.46	97.26	9.62
113121	84.91	19.34	89.09	15.94
114111	70.70	21.94	78.13	23.87
123111	77.55	31.27	76.72	30.72
211111	91.20	13.29	95.04	12.65
213111	79.90	21.71	87.79	19.73
224111	60.64	31.21	66.65	30.52
211111	87.91	16.57	96.27	8.57
312111	80.51	23.14	83.63	22.14
313111	60.89	19.40	66.15	18.46
313112	47.14	34.36	59.64	34.77
314112	44.40	34.52	51.20	36.57
314113	26.81	30.27	41.66	36.44
315113	21.74	26.59	33.05	31.99
332311	32.05	34.56	38.91	36.57
411111	61.85	20.69	65.66	19.90
412111	80.38	21.55	85.51	22.36
413111	77.68	19.68	83.54	20.64
414111	61.11	28.86	70.76	26.96
414112	52.52	27.05	61.67	28.20
415314	12.31	21.85	23.61	32.94
513111	69.40	27.53	73.65	30.88
514111	54.50	27.94	68.85	28.52
515223	28.16	32.54	35.38	30.46
515311	37.26	30.35	42.35	29.82
515431	21.66	26.46	36.27	31.82
521111	60.25	34.48	66.89	36.18
525111	24.42	32.08	32.25	36.08
535111	23.17	29.68	31.82	32.27
Average	59.05		66.07	

NOTE: Task percentages were adjusted by symptom set 112111.

^aIn order of severity, beginning with control symptom complex (normal).

Table D.15. Percent of responses in no effect and cannot do categories for tasks on TOW crew questionnaire.

Symptom Complex	Task Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do	No Effect Do
112111	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
113111	82.93	2.44	60.49	2.44	85.37	2.44	73.17	2.44	73.17	4.88	75.61	4.88	75.61	4.88	75.61	4.88
113121	70.73	2.44	65.85	2.44	73.17	2.44	65.85	2.44	65.85	4.88	68.29	4.88	68.29	4.88	68.29	4.88
114111	11.21	0.00	60.94	0.00	34.13	2.44	46.34	2.44	46.34	12.20	14.63	14.63	14.63	14.63	14.63	14.63
123111	68.29	2.44	58.54	2.44	51.22	4.88	63.41	2.44	63.41	4.88	48.78	4.88	48.78	4.88	48.78	4.88
213111	62.93	2.44	82.93	2.44	85.37	2.44	73.17	2.44	73.17	2.44	60.98	0.00	60.98	0.00	60.98	0.00
214111	51.66	0.00	65.85	2.44	58.54	2.44	26.83	2.44	26.83	4.88	26.83	4.88	26.83	4.88	26.83	4.88
224111	26.83	2.44	26.83	4.88	34.13	4.88	19.51	4.88	34.13	4.88	19.51	9.76	19.51	9.76	15.38	5.13
313111	63.41	0.00	70.73	0.00	56.10	0.00	56.10	0.00	60.98	2.44	63.41	2.44	63.41	2.44	42.50	0.00
314111	46.34	0.00	46.34	0.00	46.34	0.00	46.34	0.00	46.34	0.00	46.34	0.00	46.34	0.00	46.34	0.00
315111	39.02	0.00	46.34	0.00	34.13	0.00	34.13	0.00	60.98	0.00	39.02	4.88	43.90	4.88	34.13	0.00
316111	14.63	2.44	19.51	2.44	12.20	4.88	12.20	7.32	19.51	9.76	12.20	26.83	14.63	24.39	12.20	7.32
317111	21.95	9.76	19.51	9.76	12.20	12.20	12.20	19.51	17.07	20.00	20.00	26.83	26.83	39.02	36.59	36.59
318111	14.63	17.07	9.76	26.83	7.32	26.83	7.32	26.83	9.76	29.27	9.76	29.27	9.76	29.27	9.76	29.27
319111	12.50	22.50	10.00	22.50	7.50	30.00	7.50	30.00	10.00	30.00	10.00	30.00	10.00	30.00	10.00	30.00
320111	7.32	26.83	7.32	26.83	4.88	39.02	4.88	39.02	4.88	39.02	4.88	39.02	4.88	39.02	4.88	39.02
412111	62.50	0.00	56.10	0.00	56.10	0.00	56.10	0.00	56.10	0.00	56.10	0.00	56.10	0.00	56.10	0.00
413111	51.66	0.00	48.78	0.00	48.78	0.00	48.78	0.00	48.78	0.00	48.78	0.00	48.78	0.00	48.78	0.00
414111	37.50	2.50	42.50	2.50	32.50	5.00	32.50	5.00	32.50	5.00	32.50	5.00	32.50	5.00	32.50	5.00
415111	12.20	4.88	19.51	7.32	9.76	14.63	9.76	12.20	19.51	17.07	17.07	17.07	17.07	17.07	17.07	17.07
416111	9.76	51.22	7.32	31.71	4.88	51.22	2.44	51.22	2.44	48.78	0.00	75.61	0.00	75.61	4.88	41.46
417111	36.59	2.44	21.95	2.44	24.39	7.32	21.95	7.32	29.27	4.88	19.51	14.63	17.07	14.63	12.50	7.50
418111	21.05	9.76	26.83	9.76	17.07	12.20	14.63	12.20	31.71	17.07	9.76	34.13	10.00	30.00	12.50	10.00
419111	4.88	21.95	14.63	14.63	14.63	14.63	14.63	14.63	4.88	34.13	0.00	75.61	0.00	68.29	2.50	40.00
420111	7.76	14.63	14.63	14.63	4.88	21.95	4.88	17.07	7.32	14.63	4.88	60.98	2.44	53.56	10.00	25.00
421111	2.44	21.95	12.20	17.07	2.44	26.83	2.50	32.50	4.88	36.59	4.88	63.41	0.00	58.54	2.56	30.77
422111	53.66	2.44	51.22	2.44	43.90	2.44	39.02	4.88	46.34	4.88	43.90	9.76	48.78	9.76	30.77	7.69
423111	20.00	23.00	17.50	17.50	12.50	32.50	12.50	32.50	12.50	32.50	12.50	32.50	12.50	32.50	12.50	32.50
424111	12.20	12.20	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63
425111	55.00	0.00	92.50	0.00	92.50	0.00	92.50	0.00	92.50	0.00	92.50	0.00	92.50	0.00	92.50	0.00
426111	47.50	5.00	55.00	5.00	42.50	2.50	42.50	2.50	47.50	5.00	47.50	10.00	47.50	10.00	47.50	10.00
427111	60.98	0.00	70.00	0.00	70.00	0.00	70.00	0.00	70.00	0.00	70.00	0.00	70.00	0.00	70.00	0.00
428111	49.00	2.50	42.50	2.50	39.02	5.00	39.02	5.00	42.50	2.50	42.50	12.00	42.50	12.00	42.50	12.00
429111	45.00	2.50	42.50	2.50	40.00	5.00	40.00	5.00	40.00	5.00	40.00	5.00	40.00	5.00	40.00	5.00
430111	26.83	14.63	26.83	14.63	17.07	19.51	17.07	17.07	24.39	26.83	12.20	46.34	14.63	43.90	17.50	22.50
431111	72.50	0.00	72.50	0.00	72.50	0.00	72.50	0.00	72.50	0.00	72.50	0.00	72.50	0.00	72.50	0.00
432111	17.07	12.20	12.50	12.20	12.50	12.20	12.50	12.20	12.50	12.20	12.50	12.20	12.50	12.20	12.50	12.20
433111	12.50	20.00	12.50	17.50	10.00	32.50	10.00	32.50	10.00	30.00	0.00	68.29	0.00	65.00	2.56	30.77
434111	26.83	2.44	17.07	2.44	17.07	9.76	14.63	9.76	14.63	9.76	17.07	24.39	17.07	24.39	9.76	7.32
Average	38.85	7.65	42.15	7.05	33.50	11.37	31.91	11.67	40.62	12.09	28.13	26.17	28.56	24.51	25.33	11.15

NOTE: Task percentages were adjusted by symptom set 112111.

^aIn order of severity, beginning with control symptom complex (normal).

Table D.16. Mean percent of normal performance for tasks on TOW crew questionnaire.

Symptom Complex	Task Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.	S.D.
112111 ^a	104.70	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
113111	91.63	21.26	93.09	20.46	84.90	31.36	92.02	18.19	95.33	16.84	92.00	22.35	90.35	25.83	97.55	4.77
113121	85.04	26.09	82.01	26.06	77.59	32.63	85.78	24.99	91.46	19.81	88.00	24.58	89.06	24.43	93.48	10.02
114111	74.21	23.88	90.01	27.89	50.01	35.75	74.12	25.50	81.05	23.51	64.18	31.09	62.14	31.26	76.68	21.65
123111	83.45	27.91	81.77	28.53	70.22	37.70	80.38	26.58	89.87	19.82	83.19	24.01	84.49	24.51	86.81	21.33
211111	92.11	26.85	90.57	22.72	87.99	28.01	93.90	17.68	95.12	17.54	92.05	18.86	92.36	18.72	92.75	13.21
213111	80.56	25.29	80.16	31.02	52.02	36.25	73.69	27.05	87.12	21.06	77.80	25.73	77.55	25.34	82.67	25.18
224111	66.25	26.06	64.20	27.95	49.10	36.15	65.49	26.58	78.37	23.87	66.04	29.33	68.52	29.37	75.38	25.58
311111	86.35	20.41	86.02	23.14	73.71	33.54	85.86	19.12	92.85	12.30	89.74	19.09	88.82	19.80	88.10	19.30
312111	79.67	22.64	74.19	25.38	63.36	39.42	76.81	25.16	87.22	17.37	84.19	19.37	84.78	16.06	83.77	16.84
313111	75.53	24.42	73.46	27.48	61.03	35.40	79.76	20.82	92.83	10.99	83.39	23.66	84.20	23.64	85.82	17.75
313112	53.66	28.91	52.74	29.17	38.66	35.37	53.51	26.63	64.88	30.18	49.39	35.12	52.13	34.89	60.54	32.14
314112	54.92	31.91	50.86	30.40	34.37	34.80	53.97	32.70	59.10	34.33	42.77	37.77	45.75	38.02	52.34	33.09
314113	41.68	32.31	42.05	32.70	26.47	32.47	40.13	32.66	48.01	35.50	21.48	36.79	24.42	35.72	43.12	35.99
315113	16.22	31.09	11.16	29.29	11.75	28.14	36.24	30.72	43.77	35.05	20.92	33.28	28.50	34.79	40.15	33.74
334231	34.40	30.94	31.84	28.63	20.59	27.09	33.54	29.00	41.53	35.16	29.49	33.38	32.90	33.73	34.64	32.13
411111	76.87	27.14	78.13	27.42	65.86	36.18	79.48	24.33	93.76	12.42	86.95	16.72	87.28	13.25	82.73	21.92
412111	84.04	23.88	82.80	25.31	72.66	35.18	85.66	18.90	91.62	13.79	83.69	21.26	83.99	21.09	85.51	19.38
413111	71.16	26.72	75.50	27.94	51.89	34.88	74.24	23.80	85.37	20.65	76.18	30.37	77.35	30.15	80.80	29.17
414111	70.29	28.53	67.68	31.62	51.26	37.10	67.19	28.49	75.27	25.92	58.00	31.40	58.48	31.18	71.89	29.17
414112	51.47	28.64	50.89	32.24	30.81	31.04	55.90	29.07	61.26	35.30	47.67	38.30	49.85	37.86	52.92	29.58
415114	24.52	32.02	25.92	28.03	14.58	25.11	23.84	29.50	29.83	32.94	13.72	25.91	13.92	26.37	26.64	30.98
513111	67.82	29.52	55.87	30.46	44.78	37.58	62.84	29.57	74.15	26.93	66.39	32.46	66.32	32.01	69.05	29.69
514111	56.06	31.63	55.31	31.66	38.33	34.36	60.04	29.26	67.61	35.57	47.64	38.26	50.97	37.25	59.96	34.24
515221	31.28	26.75	37.91	33.02	12.60	16.47	29.49	26.70	36.05	32.24	12.79	25.35	18.25	29.57	25.96	27.89
515111	39.54	31.22	41.41	31.26	19.27	24.36	40.64	28.48	52.84	30.38	21.59	31.49	28.51	34.67	43.53	36.01
515431	27.22	22.22	31.45	29.89	17.30	22.91	30.72	26.81	35.64	31.89	18.97	28.83	21.37	28.60	31.13	27.79
521111	76.23	29.67	73.05	30.51	60.04	40.74	73.57	27.95	79.65	26.90	76.01	32.49	77.59	32.85	78.20	30.44
525111	46.47	34.60	40.79	33.55	25.41	34.07	43.23	32.75	46.38	37.83	19.90	32.97	20.49	33.41	40.50	35.45
535111	40.20	30.13	39.87	31.11	20.82	26.15	36.94	30.30	45.54	36.25	25.69	34.50	28.09	34.84	39.05	33.09
111121	44.01	15.75	96.67	12.05	90.77	24.88	95.87	10.97	97.93	8.50	95.36	11.43	95.18	11.57	93.73	11.67
111131	69.21	33.75	71.00	35.76	56.39	41.97	72.67	29.89	77.82	29.81	74.61	31.67	75.89	32.53	79.20	27.66
112121	91.00	12.93	89.08	21.97	82.59	31.61	91.99	17.20	94.10	17.26	90.51	15.19	90.52	15.29	89.01	18.32
112131	68.02	29.64	66.03	31.85	48.81	39.21	66.61	27.86	79.23	25.31	69.39	29.94	69.18	30.69	75.12	26.54
113131	72.57	28.82	66.51	32.61	54.01	40.82	68.73	29.71	76.43	27.21	69.73	32.49	68.72	33.08	73.73	28.17
114112	53.17	35.57	51.42	34.82	37.00	36.25	52.07	32.88	55.21	38.82	35.67	37.54	38.81	38.69	53.64	39.53
212111	67.48	22.26	66.25	23.87	79.90	33.36	82.49	24.40	89.84	16.14	86.25	19.00	84.91	20.02	86.64	17.40
214112	47.59	31.50	47.21	33.25	38.44	37.15	53.42	30.64	57.63	33.88	41.90	38.49	42.27	36.81	56.63	35.73
215113	37.26	30.68	36.26	29.94	31.33	32.12	36.42	31.85	47.45	36.31	19.03	30.26	22.33	32.43	37.82	33.04
314111	62.43	28.27	59.49	31.21	41.40	35.26	59.44	28.68	71.05	30.07	54.67	36.22	54.17	35.40	68.13	29.26
Average	64.71	63.58	49.71	64.21	71.74	59.43	60.76	67.39								

NOTE: Task percentages were adjusted by symptom set 112111.

^a In order of severity, beginning with control symptom complex (normal).

Appendix E

ANALYSIS OF CONFIDENCE RATINGS

The results of two analyses performed on the confidence ratings are summarized. The respondents were asked to estimate how confident they were of their judgments on a scale of 1 to 5 (1 = not at all and 5 = certain), after they completed ratings at each symptom level. Therefore, there was a confidence rating supplied by respondents for each symptom set.

First, differences in the distributions of confidence ratings were compared across crews, in terms of the frequency of responses in each of the five categories. Table E.1 shows the median response across crews and the percent of responses in each confidence level for each crew. Approximately 1.2 percent of the responses were missing across the four crews, leaving a total of 3820 confidence ratings. Most respondents rated their confidence as a lot (category 4) or some (category 3), across symptoms. Only 4.4 percent of the responses fell into the lower two levels, suggesting respondents were, on the whole, confident of their ratings.

There were no outstanding differences among the four crews with respect to the distribution across the classes and only minor differences in the median. This equivalence between crews was surprising because of the

Table E.1. Distribution of responses to confidence levels 1 through 5 across 30 symptom sets for four crews.

Crew	Confidence Level (%)					Median (%)
	1	2	3	4	5	
Artillery gun	0.2	3.0	43.4	40.4	13.1	3.50
FDC	0.5	4.4	37.4	49.0	8.7	3.66
Tank	0.5	4.2	40.6	41.4	41.4	3.61
TOW	1.7	2.3	36.6	50.0	9.4	3.69
All crews combined	0.8	3.6	39.1	45.5	11.0	3.65

differences between the artillery groups, on the one hand, and the tank and TOW groups on the other hand, in pay grade, experience, and supervision. This lack of substantive differences between the crews suggests, that these demographic characteristics were uncorrelated with the ratings.

The second analysis compared the distribution of confidence levels between symptom sets, in order to examine whether the severity of symptoms would affect the confidence ratings. Table E.2 shows the median response and distribution of responses across the five categories at each symptom level. The symptom sets are ordered in terms of the rank order of severity across the four crews. Combined crew responses are shown and it was found that analysis of the separate crews did not reveal noteworthy differences among the crews. The symptom sets generally did not differ substantially in the distributions across confidence levels. Most responses were made at confidence levels of 3 and 4, and responses in the two lowest confidence level categories were relatively infrequent. Furthermore, the range of confidence level medians, between a low of 3.46 percent for symptom set 313112 and a high of 3.88 percent for symptom set 112111, indicated that there was not much diversity across the symptoms.

There appeared to be a moderate trend to be more confident at the ends of the severity continuum. The median for the five mildest symptoms was 3.76 percent; for the middle five symptoms, 3.63 percent; and for the five severest symptoms, 3.70 percent. Perusal of the distribution for the symptoms involved suggested that responses for milder symptoms were somewhat more frequently grouped at the upper end of the scale. At the severe levels there appeared to be a tendency to use both ends of the scale. However, these tendencies are small compared with the substantial agreement in the distribution.

Table E.2. Distribution of responses to confidence levels 1 through 5 as function of perceived severity of symptom sets across crews.

Symptom Complex ^a	Confidence Level (%)					Median (%)
	1	2	3	4	5	
112111	0.8	3.2	24.2	57.3	14.5	3.88
113111	0	2.3	32.0	51.6	14.1	3.80
311111	0	3.9	41.1	45.0	10.1	3.61
211111	0	1.6	34.9	49.6	14.0	3.77
113121	0	1.6	37.8	50.4	10.2	3.71
213111	0	1.6	44.9	44.1	8.7	3.58
313111	0.8	3.2	44.4	42.1	9.5	3.54
412111	0	4.0	38.9	46.0	11.1	3.65
123111	0	3.9	41.9	44.2	10.1	3.60
411111	0	1.6	39.5	51.2	7.8	3.67
312111	0	3.9	43.3	43.3	9.4	3.56
413111	0.8	4.8	43.7	44.4	6.3	3.52
114111	0	4.0	37.3	51.6	7.1	3.67
521111	0	2.3	42.4	42.4	9.3	3.63
513111	0.8	3.9	40.6	46.9	7.8	3.60
414111	0	3.9	37.8	48.0	10.2	3.67
224111	0	4.7	43.0	44.5	7.8	3.55
313112	0.8	2.3	48.8	38.0	10.1	3.46
514111	1.6	3.1	39.4	48.8	7.1	3.62
414112	1.6	3.1	42.5	44.1	8.7	3.56
314112	0.8	4.8	45.2	38.9	10.3	3.48
515311	1.6	3.9	39.8	43.5	9.4	3.61
314113	1.6	3.0	40.9	41.7	11.8	3.61
525111	1.6	4.0	37.3	42.1	15.1	3.67
315113	2.4	5.6	35.7	42.1	14.3	3.65
331231	2.3	5.5	34.4	45.3	12.5	3.67
535111	0.8	3.1	38.8	44.2	13.2	3.67
515223	1.6	3.1	33.6	44.5	17.2	3.76
515431	2.4	2.4	36.5	43.7	15.1	3.70
415314	1.6	4.7	31.3	43.8	18.8	3.78
All symptom complexes combined	0.8	3.6	39.1	45.5	11.0	3.65

^aIn order of severity, beginning with control symptom complex (normal).

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